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VOL. 77 No. 1961

9 February 1957

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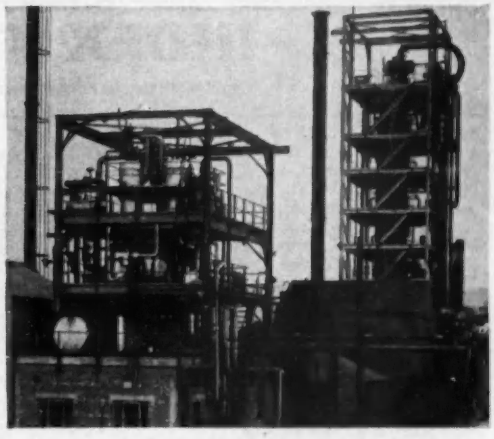

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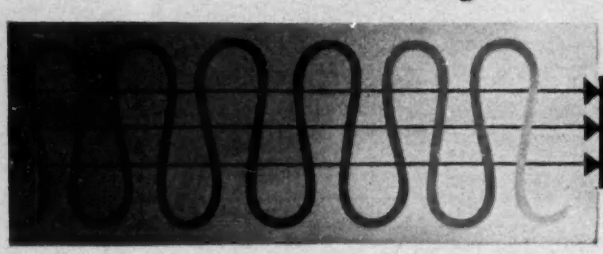

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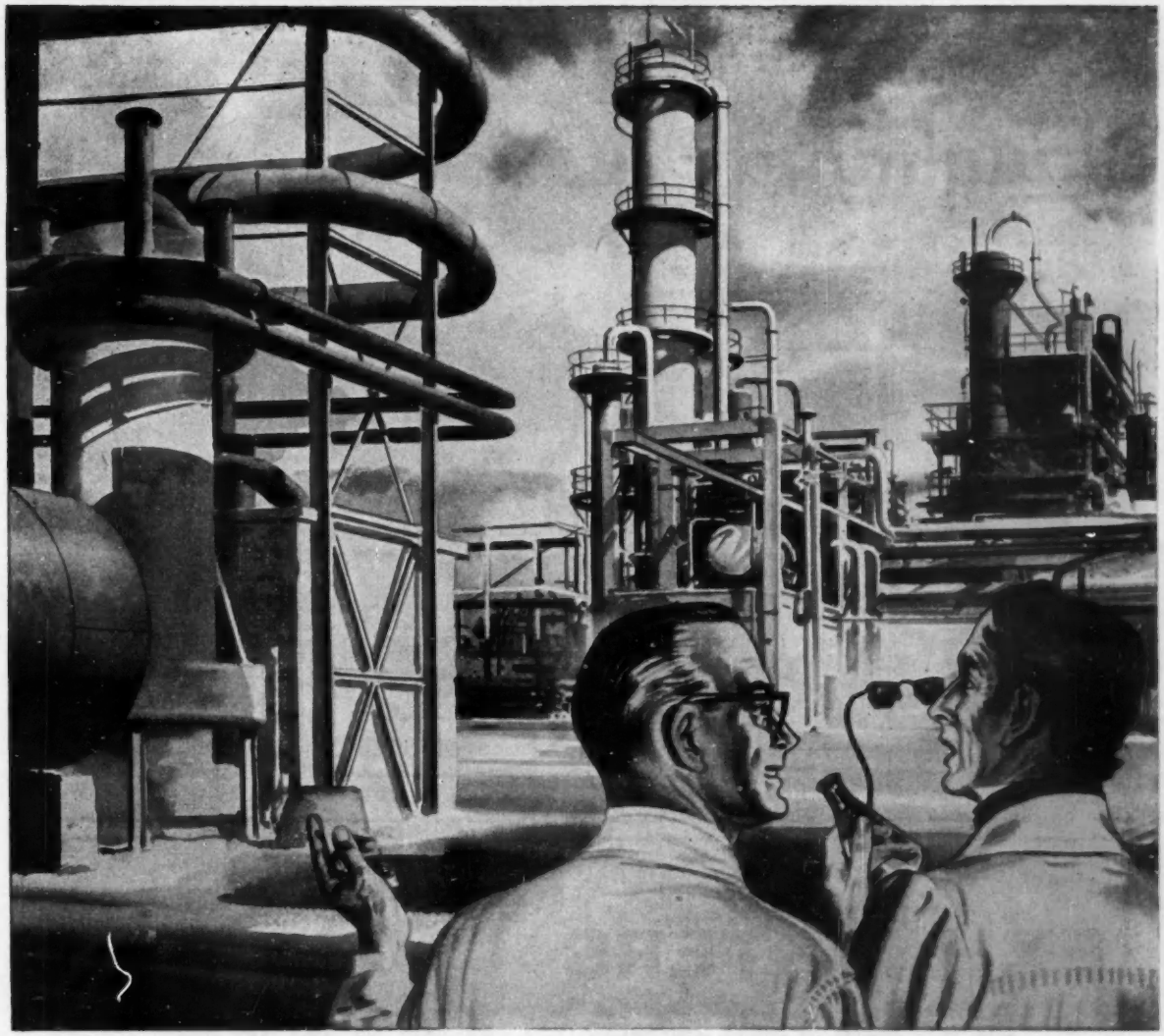

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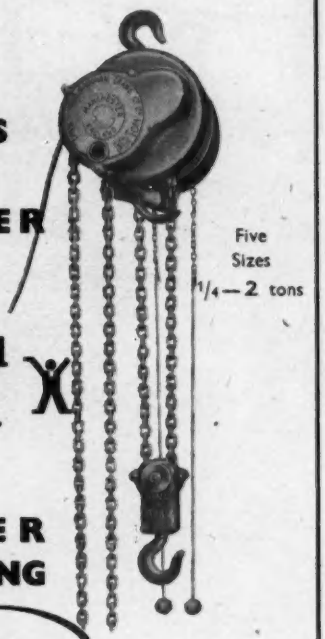

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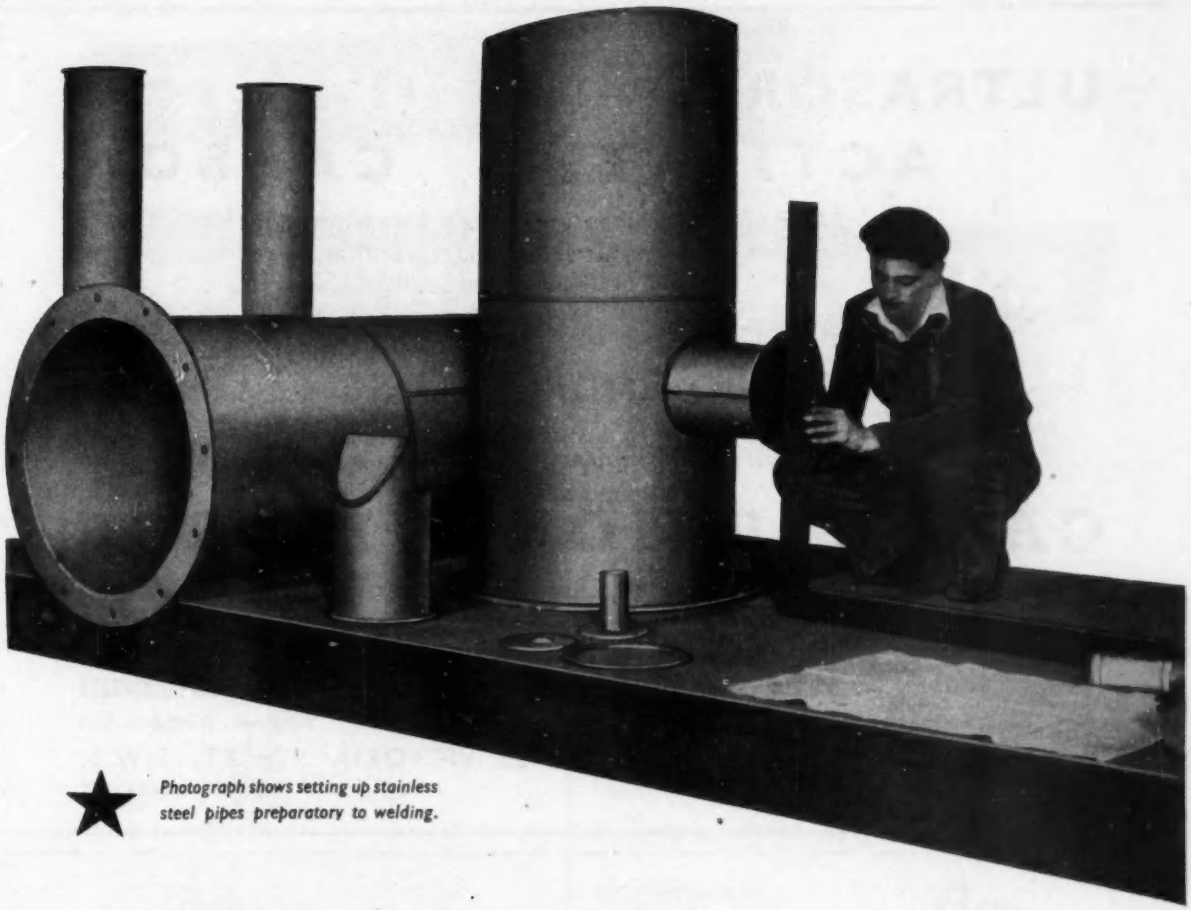

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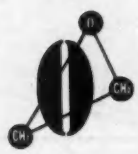

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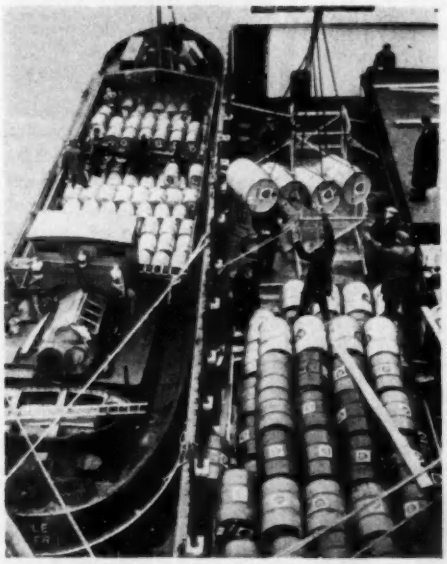
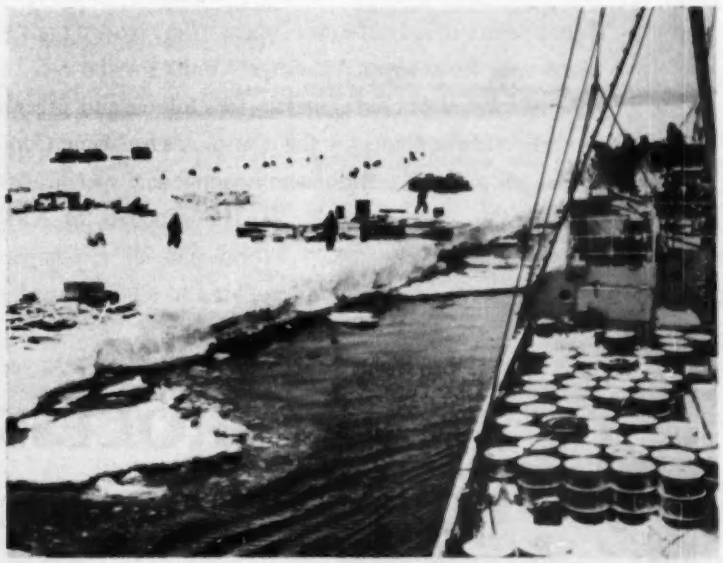


BRABY "D"-type Steel Drums being loaded on to M.V. "MAGGA DAN" at London docks.
(Photograph by courtesy of B.P. Trading Ltd.)



BRABY "D"-type Steel Drums on M.V. "THERON" waiting to be unloaded at Shackleton Base in the Weddell Sea.
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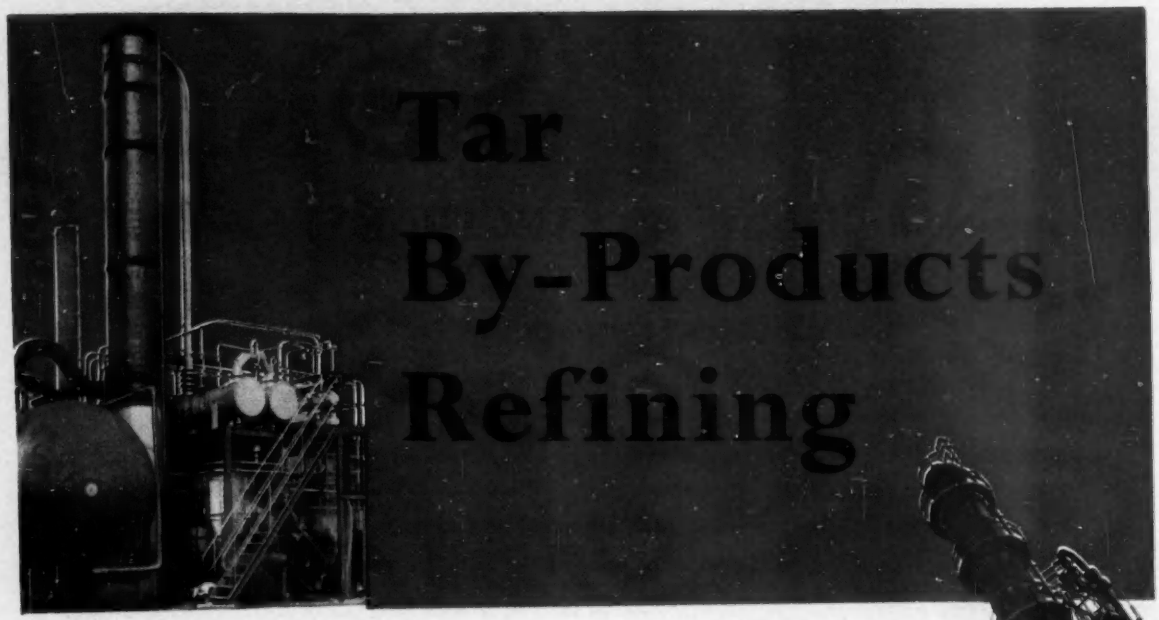

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Editor M. C. HYDE
Manager H. A. WILLMOTT
Director N. B. LIVINGSTONE WALLACE

Midlands Office
Daimler House, Paradise Street, Birmingham. [*Midland* 0784-5]

Leeds Office
Martins Bank Chambers, Park Row, Leeds 1. [*Leeds* 22601]

Scottish Office
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D

MAN-MADE FIBRES

BRITISH OUTPUT of man-made fibres reached a new record in 1956. A total of 482.6 million pounds weight was produced, an increase of 2 per cent on 1955.

According to *Rayon Revue*, an AKU of Arnhem issue, world production of rayon fibre in 1956 was expected to show an increase of 10 to 15 per cent. In 1955 world production amounted to 1,234,000 tons and was the first time it had equalled world output of wool.

Rayon and man-made fibres are of increasing importance to Lancashire textile manufacturers, whose consumption of yarn is estimated to comprise 70 per cent cotton and 30 per cent rayon and synthetic fibres, and whose cloth output is 71 per cent cotton and 29 per cent cloth made wholly or partly from man-made fibres.

The increase noted above was due to the greater demand for staple fibre which totalled 255.6 million lb. during 1956. Production of continuous filament yarns at 226.8 million lb. was lower than in 1955. Reasons for the difference are due to the fact that tyre manufacturers are the chief industrial users of rayon and other man-made filament yarns, and their demand has fallen as a result of lower motor-car production. Staple fibres, however, have a growing range of uses in fabric blends for clothing, and recently carpet manufacturers have become important customers for staple.

It seems likely that most of the planned increases in nylon and Terylene output will be in staple fibre, to be used in fabric mixtures for clothing. Production figures, as now published, make it impossible, however, to separate production of rayon from that of the new synthetics, nylon, Terylene and others. It is considered that rayon still accounts for the greater part of the total production of man-made fabrics, but nylon and Terylene may well account for a considerable proportion of the increase in staple production.

According to the Commonwealth Economic Committee world production of synthetic fibres for 1953 to 1956 is as follows.

Thousands of Tons

Synthetic	1953	1954	1955	1956
Nylon	77	79	113	144
Dynel	2.2	3.1	11.3	11.3
Saran	9	16	16	16
Orlon	8	12	18	21.6
Acrilan	1.8	2.2	13.5	13.5
Dacron	3.6	6.8	16	16
Polythene	9.5	10	11.3	11.3
Vinyon	1.2	0.9	2.2	2.2
Great Britain				
Nylon	5	9	13.5	18
Terylene	0.5	0.5	5	10
Canada				
Nylon	4.5	4.5	6.5	9
Japan				
Nylon	2.3	4.5	9.5	11
Vinyl product	4.5	5	13.5	23
Italy				
Nylon	2.3	3.1	4.5	5.4

Obviously as output of synthetic fibres is increased, detailed production figures will be required, and when nylon and Terylene form a major part of total man-made fibre production, it will be of interest to note whether the increase in these synthetics will take place at the expense of rayon or whether they will displace cotton and wool.

There are many reasons for the spectacular growth of synthetics, such as an ever-increasing demand for textiles which cannot be met by Mother Nature, development of fibres which will wear better and the desire to produce fibres to exact specifications. No doubt in time it will be possible to produce synthetics with the best characteristics of wool and cotton. Experiments already under way include blending together of two groups of molecules in a common solvent and spinning the compound which results. Examples of this include cyanoethylated cotton, cellulose acetate and other polymers blended together.

Non-woven fabrics consisting of a mass of staple combined either by heat or by a binder adhesive have also aroused great interest. In the US the market for these has increased from a few thousand pounds weight 11 years ago to an estimated 50 to 75 million pounds in 1955.

Research is also being done on a non-woven fabric described as a cross-laid web of nylon, rayon, glass, and cotton or other fibre, bonded by an adhesive and laminated between two layers of cellulosic skin of high wet-strength paper. Such a product could be sold very cheaply and used for disposable clothing.

Considerable scope exists for research and development in new fibres for there is a wide margin between 'lost cost' and 'luxury' synthetics.

Last year saw the introduction in the US of Verel (Eastman Chemical Products), a modified acrylic with properties making it possible to use it in wool and cotton blends. Zefran (Dow Chemical) is another new synthetic which is described as a nitrite alloy combining an inert crystalline and a dye-receptive component. It is also suitable for blends and can be processed on conventional textile equipment.

Isotactic polymers and synthetic polymers are very much to the fore at the present time. The reason why interest is being shown in isotactic polymers is that the typical starting materials for isotactic polyolefins are propylene and butylene, obtainable from petroleum cheaply and in quantity. Although still very much in the experimental stage, isotactic polymers are believed to be as strong or stronger than nylon. Also these fibres can be made into silk-like or wool-like yarns and rope.

Information on synthetic polypeptides is scanty. Previous attempts to produce protein fibres were based on the use of regenerated fibres obtained from natural materials, but there are now indications that synthetic protein fibres may be possible.

Polythene fibres have been produced but are said to have poor temperature characteristics. A polypropylene fibre, however, is thought to be preferable but patents are involved.

SELENIUM SHORTAGE ABATING

MUCH interest has been aroused by the news that in the US the price of commercial grade selenium has recently been reduced. Last year the US price rose as high as $35 a pound in the grey market, but is now reduced from $15.50 to $12.00 a pound. The reason advanced in the US is increasing production of selenium as a by-product of copper refining. By means of improved recovery techniques, American Smelting and Refining last year increased production by over a third.

In the UK selenium has been on allocation. Officially the price was about £5 a pound but in 1955 and early last year as much as £18 a pound was being paid in the black market. The official price today is £4 to £5 a pound and the 'open market' price £12 to £15 a pound.

Countries supplying this country with selenium are Canada, Rhodesia, Scandinavian countries and Japan. However, a home source of selenium was the result of a discovery by two sulphuric acid manufacturers. Imported pyrites contain selenium in concentrations of a few parts of selenium per million, certainly not in any sufficient quantity to be considered worth extracting. The two manufacturers were concerned about a red sludge forming during sulphuric acid manufacture which was found to contain from 1 per cent to 10 per cent of selenium. This toxic unwanted sludge, however, has been sold at a profit during the selenium shortage.

Rhodesia has been supplying selenium from the anode slimes formed during electrolytic refining of copper. Presumably as copper refining has increased in Rhodesia (last year Rhodesia had record output of copper) so has the amount of anode slime and consequently, of selenium, particularly as improved methods of recovery of selenium are now being used.

The greater part of selenium produced is used by the electrical industry. However, silicon and germanium transistors have developed so rapidly and are now beginning to compete with those of selenium, that this is suggested by some as contributing to the fall in selenium prices.

Main user of most of the remainder of the selenium is the glass industry, 80 per cent of the total being used to decolorise glass and 13.4 per cent being used to colour glass for lenses, refractors etc.

Because of the supply position and price of selenium there has recently been a mention of a new colouring agent for producing a red glass. Details regarding the new pigment are not known but a mercury pigment has been suggested.

With increased outputs of selenium as a result of greater electrolytic refining of copper, improved selenium recovery and a decrease in the electrical industry's requirements of selenium the price will obviously fall. Lower price, however, could mean an increased use of selenium colourings for ceramics and glass and another promising outlet is likely to be phosphors for television screens.

$TiCl_3$ REDUCED IN PRICE

UNTIL very recently, titanium trichloride was available in research quantities at $110 a pound (*Chem. & Engng. News*, 1957, **35**, 7). Now the Stauffer Chemical Company states that it is producing it on a semi-commercial scale. Hundreds of pounds a day can be produced, and the company is offering the compound at $10 a pound. Further price reductions are expected as demand increases.

Titanium trichloride holds much promise as a co-catalyst for synthesis of low pressure polythene and isotactic polymers of propylene and butene.

It is claimed that catalysts containing titanium trichloride give 85 to 95 per cent yields of polypropylene, compared with only 35 to 45 per cent with titanium tetrachloride.

At present, the cost of the titanium trichloride at $10 a pound is still high compared with the price of titanium tetrachloride. However, if the catalyst gives high yields in the polythene synthesis, its price should not be a limiting factor.

Titanium trichloride is available in small quantities in the UK as a 15 per cent solution.

A European Chemical Processing Plant for Irradiated Fuel

OEEC Committee Discusses Joint Projects

SPONSORING by OEEC of a number of joint European undertakings was the subject of a meeting of the steering committee for nuclear energy held in Paris on 24 January. These projects include a chemical processing plant for irradiated fuel; co-operation on experimental reactors; and the operation of nuclear power stations.

Main purpose of the meeting was to examine the work of the various groups of experts set up by the Council of Ministers last July with the object of establishing the first joint undertakings of the Organisation for European Economic Co-operation. Professor L. Nicolaidis (Greece) presided.

The steering committee first heard an account by Dr. E. Pohland (Germany), chairman of the study group set up a few months ago by 14 European countries for the joint construction of a chemical processing plant for irradiated fuel.

Discussion of the quantities and types of fuel for processing in a joint plant from 1960 onwards led the study group to concentrate on a project for a chemical processing plant which could deal with about 50 tons of natural or slightly enriched uranium a year.

Twofold Purpose

Purpose of this plant would be twofold. In the first place it would be used for the treatment of various types of fuel from 1960 onwards. Secondly, it would serve as a pilot plant for the possible erection of a large-scale installation designed to treat greater quantities of natural uranium after 1964-65. The plant would also be equipped with extensive research facilities.

The project drawn by the study group is to be ready within two months: it will include a lay-out of the various parts of the plant, a study of the technical problems involved in its construction, an estimate of the investments required, and proposals as to site.

In addition, a group of legal and financial experts is studying the form in which this undertaking can be constituted.

After considering various possible formulae, the great majority of the group favoured the formation of an international company, which would permit the participation either of Government representatives or representatives of public or semi-public institutions or private firms, depending on the country concerned.

Consultant to the OEEC, Dr. L. Kowarski, then informed the steering committee of the conclusions of the committee of experts set up to make proposals for European co-operation in the field of experimental reactors.

The work of the committee of experts was designed to prepare a list of experimental reactors to be planned and built as soon as possible in West Europe, taking into account the most advanced nuclear technology to be expected by 1963. The committee also discussed the form in which such a programme might be achieved jointly.

In the first place the committee's programme envisages the construction of a materials testing reactor with a high neutron flux and also a prototype light water-boiling reactor; secondly, the construction of a homogeneous aqueous reactor; and, thirdly, studies for a liquid-metal fuelled reactor and a fast breeder reactor and on the technology of other types of reactors, and in particular on the use of plutonium.

Joint implementation of a programme of this kind would take several years, the committee considered, and would cost about $30 million per year.

To enable the programme to be carried out rapidly, several members of the steering committee felt that a number of reactors might be built jointly in the vicinity of existing national centres, so that use could be made of their facilities. It was, for example, suggested that a start might be made in the UK, France and Germany.

Progress made by the working group set up to make proposals for the construction and operation of nuclear power stations in the form of joint undertakings was also considered by the steering committee.

The experts' work envisages the development of projects for nuclear power stations in Europe, capable of rapid completion and construction, as far as possible, in Europe. They are therefore studying types of reactors on which adequate experience is available and, in particular, gas-cooled natural uranium and graphite reactors, pressurised water reactors, sodium-cooled graphite reactors and boiling water reactors.

It was concluded by the experts that an effort should be made to co-ordinate projects for the purchase and building of prototype power reactors now under consideration in a number of European countries, and to this end they envisage the organisation of a system for exchange of information between companies operating such reactors.

The steering committee also noted the progress of work regarding the creation of a security control organisation to be applied primarily to joint undertakings and their products. This work is guided by the basic rules for security control contained in the statute of the International Atomic Energy Agency, signed in New York last October.

The committee took note of the initial conclusions of the experts who are studying the measures to be adopted to achieve the fullest possible liberalisation of European trade in nuclear products.

Problems regarding the organisation of the European Nuclear Energy Agency, for which the Council had instructed it to prepare a draft statute, were discussed. Study of this subject will be continued at the next session.

Finally the steering committee approved a report to the Council on the progress of its work. This report indicates that the committee will be in a position to draft proposals on all the subjects under consideration within three months. These proposals can then be submitted to Governments for decision and, in particular, will result in setting up the first joint undertakings of the OEEC.

DU PONT AND BRITISH OXYGEN GET GO AHEAD ON ULSTER PROJECTS

PLANS TO GO AHEAD with the construction of a neoprene synthetic rubber plant in Northern Ireland have been announced by the Du Pont Co. (United Kingdom) Ltd. Acquisition of a 381 acre site near Londonderry was announced in November last year (see CHEMICAL AGE, 1 December, p. 358). Approval has been obtained from the Bank of England and the Capital Issues Committee for financing the scheme. Start of construction is scheduled for mid-1957.

The British Oxygen Co. has announced that its subsidiary company, Carbide Industries Ltd., has arranged to purchase a site of 50 acres near the Du Pont Company site.

Carbide Industries Ltd. has arranged with the Northern Ireland Electricity Board for the supply of a large block of power from the newly planned power station which will be on an adjacent site.

Assuming satisfactory arrangements for the acquisition of facilities and supplies, Carbide Industries Ltd. plans to produce acetylene primarily for supply to the Du Pont Company.

Site work is expected to start within the next 12 months. The number employed in construction is expected to rise to over 100 and eventually in production to over 300.

Speaking in the Northern Ireland House of Commons on 5 February, the Prime Minister, Lord Brookeborough, said:

'I particularly welcome the manufacture in Northern Ireland of these basic industrial materials because they should add further to its attractions for other industries which make use of them in their processes of manufacture. Before deciding to establish plants, both the Du Pont Co. and the British Oxygen Co. examined in great detail the economies of production in Northern Ireland, and it is heartening to have its advantages as an industrial location confirmed by their decision to come here.'

UK CHEMICAL INDUSTRY'S CAPITAL EXPENDITURE IN 1957

AN INCREASE in chemical output of 5 per cent is expected when full production figures for chemicals in 1956 are available. This is about half the average rate of increase over the previous seven years. A similar increase occurred in the value of UK chemical exports which rose to the record figure of £244 million.

It is considered that capital spending in the chemicals and allied industries, including oil refineries, is likely to be 23 per cent higher this year than in 1956. In the first three-quarters of last year the increase in capital spending on the corresponding period of 1955 was 43 per cent.

The petrochemical industry will show the largest increase for schemes totalling about £45 million are now under way and will double the industry's investment in plant. Thus, British Hydrocarbon Chemicals has almost completed its £8 million scheme for doubling its olefin output at Grangemouth. Esso Petroleum Co. is now starting a £9 million scheme for processing 250,000 raw petrol annually. Shell Chemical Company has on hand a £6½ million plant project to convert refinery gases into ammonia and nitric acid to be used in a £4½ million fertiliser plant to be built by Fisons Ltd. Union Carbide should have its £4½ million, 11,500 ton capacity polythene plant in operation at the end of this year.

Imperial Chemical Industries Ltd. has begun its £16 million expansion plans for production of petrochemicals. Polythene production is to be increased to three times the 1955 figure. ICI Dyestuffs Division is to bring its new 10,000-ton nylon polymer plant at Wilton into operation by phases during the year. ICI are also expected to have a magnesium nitrate plant capable of concentrating 16,000 tons of weak nitric acid yearly—first of its kind in the UK—in operation by the summer.

Extensions to ICI Plastics Division polyvinyl chloride plant at Hillhouse will increase capacity to 50,000 tons. At ICI's synthetic rubber plant at Wilton, Fluon (polytetrafluoroethylene) capacity will be doubled to 200 tons a year. A pilot plant will shortly be completed for production of Melinex film—chemically similar to Terylene. In all, the Plastics Division expects to spend some £7½ m.

A new Perspex plant will be on stream shortly at ICI's General Chemicals Division, Billingham. Chlorine-using plants are also to be extended. ICI Billingham Division will have its higher alcohols plant in operation in the spring, and a plant to manufacture ammonia by the Texaco process by the summer. Plant for the manufacture of calcium and aluminium silicates and silica fillers will be set up by Alkali Division.

Monsanto Chemicals Ltd. has now completed its maleic anhydride plant at Newport. A cyclohexylamine plant will also come into production at Newport. A part of the output will be used for rubber chemicals, and the rest will be marketed.

Isotactic Polymers : Professor Natta's Lecture at London Meeting

PROFESSOR G. N. NATTA'S lecture on 'Isotactic Polymers' given at a joint meeting of the London Section and the Plastics and Polymer Group of the Society of Chemical Industry on 4 February, was very well attended. The lecture, however, was marred by inadequate seating for the very large audience, and poor delivery of the lecturer.

In his lecture Professor Natta considered particularly polypropylene and polybutadiene polymers. He showed the configuration of polybutadiene-1-4 cis, polybutadiene-1-4 trans, polybutadiene-1-2 isotactic and polybutadiene-1-2 syndyotactic. He then went on to discuss the crystalline structure of these polymers and the effect of this in producing interesting properties such as moulding and high tenacity fibres. Molecular models of polypropylene and polybutadiene were shown and discussed. Melting points of polypropylene etc. were indicated. The linear form of polypropylene had a melting point of 165°C while the branched form melted at over 240°C. Some very interesting photographs indicated the crystalline structure of polystyrene, polypropylene and polybutadiene under the microscope.

Professor Natta then discussed at some length sterio-specific and sterio-selective catalysts, and indicated the structures of titanium trichloride and titanium dichloride. He showed by means of graphs that the catalyst remains constant for up to 100 hours after an early settlement period. He considered aluminium triphenyl (employed as the ethearate) and aluminium as catalysts.

Fractionation of polypropylene was dealt with by the Professor. Also the physical properties of polypropylene and polybutylene were considered and compared with the properties of Marlex 50, Rotene, Rotene L and Fertene, this last being a high pressure product. The effect of linear structure, arrangement of crystalline groups and production of suitable fibres was outlined.

In the discussion which followed Professor Natta stated that a pilot plant was in operation at Ferrara. He also informed the audience that the first commercial plant would be in operation fairly soon. The plant will produce 400 to 500 tons of polymer a month.

The catalytic reaction employed is evidently similar to that of Ziegler. The Professor in reply to a question regarding the production of the catalyst used i.e., titanium trichloride or dichloride stated that the trichloride or dichloride was obtained by treating titanium tetrachloride in a hydrogen gas phase.

Prof. Blackett to Open Physical Society Show

PHYSICAL SOCIETY EXHIBITION of Scientific Instruments and Apparatus will be held from Monday, 25 March to Thursday, 28 March at the Royal Horticultural Halls, London. Professor P. M. S. Blackett will open the exhibition at 11 a.m. on 25 March.

As in previous years the emphasis will be on new developments in scientific instruments and apparatus and on the possibility of their applications in manners not yet thought of. Demonstrations and lectures will be held at 6.15 p.m. as follows: 25 March, International Geophysical Year, by Sir Harold Spencer Jones, 26 March, Supply and distribution of liquid helium, by Dr. E. Mendoza; March 27, Recent trends in acoustics, by Professor E. G. Richardson.

Admission tickets are not necessary for these sessions. Entrance to the exhibition is by ticket only, obtainable free of charge from the Physical Society, 1 Lowther Gardens, Prince Consort Road, London SW7.

Training of Chemical Engineers in the North

THE TWELFTH annual general meeting of the North-Western branch of the Institution of Chemical Engineers was held on 25 January. Professor Frank Morton delivered an address on 'The Expansion of Chemical Engineering Education in the North of England.'

Professor Morton commented on the high standard of the students who are taking the sandwich course in chemical engineering at the Royal Technical College, Salford. The course for undergraduates leading to B.Sc. Chemical Engineering in three years at Newcastle-on-Tyne is progressing favourably. At Leeds new buildings are being erected and there is a four-year chemical engineering course for undergraduates. A combined course in Fuel Technology and Chemical Engineering is held at Sheffield University.

The expansion of the College of Science and Technology at Manchester has been very great and much land has been bought for still further development. Progress in the expansion of chemical engineering education has been made in Manchester and a greater expansion is projected. Such an expansion brings problems which have to be solved, a larger teaching staff has to be provided, vacation courses in industry have to be found for a large number of students, and for practice in design work by the more advanced students. Professor Morton proposes that tutors from industry should instruct them for a few hours per week. Facilities for research by graduates is necessary for the success of such a school of chemical engineering.

Chemical Plant Power

When completed this year, the new Associated Ethyl Chlorine Plant at Ellesmere Port will be powered by 220 British Thomson-Houston motors from 2- to 125-h.p. When complete over 2,100 BTH motors will be in service.

GEC-SIMON-CARVES ATOMIC POWER

New Power Station for South Scotland Electricity Board

FURTHER details have now been given of the design of the atomic power station which is to be built by the GEC-Simon-Carves Atomic Energy Group for the South of Scotland Electricity Board. The placing of this contract with the GEC was announced on 13 December 1956. Work on the station, which will have an ultimate electrical output of 320,000 kilowatts, is to begin during the first half of this year, and the first reactor is scheduled to become critical in 1960-61.

Reactor Core: The reactor core structure will be composed of machined graphite bricks and tiles to form a cylinder, 50 ft. 6 in. in diameter and 28 ft. high weighing 2,150 tons. The central portion of this structure is the core proper containing the fuel and control rod channels; the remainder constitutes a graphite reflector which reduces neutron leakage from the core. Average thickness of this reflector is 3 ft. at the sides and 2 ft. 6 in. at the top and bottom.

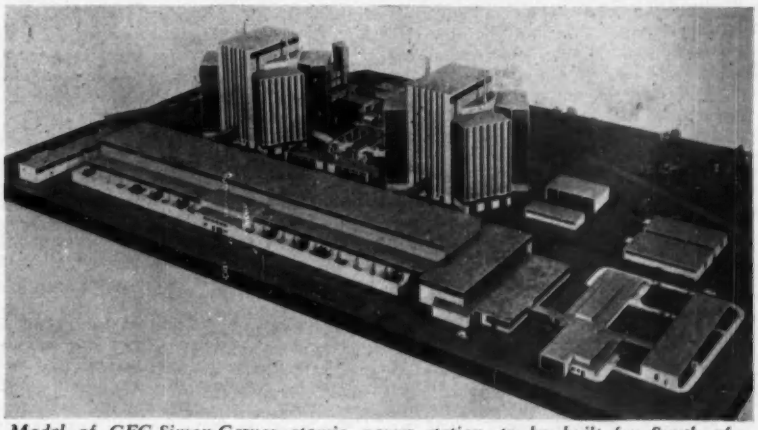
Fuel Elements: Reactor fuel will consist of pure natural uranium metal containing 0.7 per cent of fissile U235. Each fuel element will be in the form of a cylindrical rod 1.15 in. in diameter and 24 in. long weighing nearly 17 lb. (7.64kg.). There are to be 10 rods per channel and 32,880 rods per reactor. Total weight of uranium per reaction will be 251 tonnes.

10 Fuel Elements

Of interest is the method of support of the 10 fuel element developed by the GEC and known as the GEC replaceable channel fuel element. Essentially each canned fuel element (the fuel cans are of magnesium alloy with extended surfaces in the form of fins) is individually supported and located by non-metallic 'spiders' inside a relatively large bore graphite tube. These graphite tubes are stacked in the channel so that weight leads are not borne by the cartridges.

The main gas flow is up the bore of the graphite tube in direct contact with the fuel elements. A small quantity of gas is also allowed to pass up the annular space between the graphite sleeve and the main moderator channel to extract the heat (about 6 per cent of the total) generated by collision processes in the graphite itself.

Nuclear data: Maximum thermal neutron flux in uranium is 2.0×10^{13} neutrons/cm^2/sec. approximately. The total built-in excess reactivity at start-up (reactor cold) is given as 4.57 per cent in k.



Model of GEC-Simon-Carves atomic power station, to be built for South of Scotland Electricity Board

Spherical Pressure Vessel: Selection of the steel for the reactor sphere has involved consideration of resistance to temperature, resistance to failure by deformation by creep at the operating temperature, resistance to failure by brittle fracture, and weldability. A fine-grained aluminium-killed type of steel known commercially as Lowtem or Coltuf 28 has been chosen. Coltuf 28 is produced by Colvilles Ltd.

The sphere is to be 70 ft. in diameter, and the thickness of the shell is 2⅞ in. with support courses of 3 in. It will withstand gas pressure of 150 p.s.i.g.. Weight of gas in the vessel under operating conditions will be 41.4 tons. Under normal running conditions no part of the sphere will be at more than 450°F, well below the creep range of the steel used.

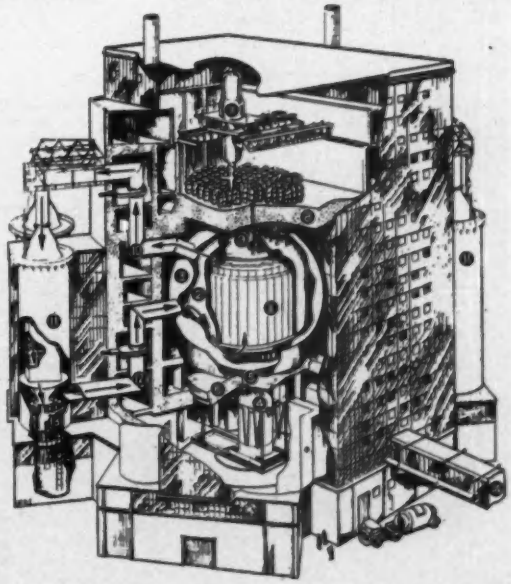
A boiler plate made of silicon-killed mild steel will be used for the inner vessel. It has to withstand only the pressure drop across the core of 4 p.s.i. Cooling is to be carried out by the incoming gas stream and at its hottest point it will be at a temperature of approximately 130°F below the gas outlet temperature (745°F).

Control Rods: Composed of boron, the control rods are to contain inserts canned in thin stainless steel sheet and packed in tubular stainless steel control rods. The number of rods per reactor will be 150. Each rod will be 21 ft. long with a diameter of 2 in. and will weigh 70 lb.

Control rod grouping will be composed of the shut-off group (1.25 per cent in k), the fine control group (0.4 per cent in k) and two course groups (4.85 per cent in k) and the total reactivity controlled will equal 6.5 per cent in k.

Biological Shield: Reinforced concrete will be used for the biological shield, which will have walls 9 ft. thick and a roof of 10 ft. 6 in. Shield cooling will be effected by once through forced and induced draught air-cooling, air flow being directed over or through concrete walls.

Reactor Design Performance: Gas



Sectional elevation of one of the reactor buildings (arrows show direction of gas flow). Key:

1. *Reactor core*
2. *Inner steel shell*
3. *Spherical pressure vessel*
4. *Charge-discharge machine*
5. *Charge-discharge standpipes*
6. *Lower concrete shield*
7. *Reactor servicing machine*
8. *Upper concrete shield*
9. *Control rod standpipes*
10. *Hot gas duct*
11. *Steam raising unit*
12. *Cool gas duct*
13. *Gas circulator*
14. *Pipe bridge to turbine hall*

temperature at the reactor which will be 240°C (400°F). Bulk gas temperature at the reactor outlet will be 396°C (745°F). Gas pressure at the reactor inlet will equal 150 p.s.i.g. and at the outlet, 145.8 p.s.i.g. Mean fuel rating is given as 2.11 MW/tonne. The total gas flow rate will equal 5,640 lb./sec. Heat transferred to gas from reactor will be 530 MW and the heat transferred from gas in steam raising units will be 540 MW.

Main Circulators: These will be of the vertical shaft type. There will be eight per reactor. Outlet gas pressure will be 150.5 p.s.i.g. and the gas pressure rise across the circulation will equal 7.5 p.s.i.g. Electrical power consumption per reactor is estimated at 12.6 MW and the running speed at 1,000 r.p.m. A grid controlled mercury arc rectifier will control the speed.

The number of ducts per reactor will total 8 inlet and 8 outlet. Each duct is to have a diameter of 5 ft. Gas transmit time round the circuit will be 23 seconds. There will be 8 steam raising units per reactor.

Steam Raising Units: Total gas volume of these units will be 18,000 cu. ft. and under operating conditions the total weight of gas will be 5.2 tons. At high pressure the steam flow will be 143.1 k. lb./hr. the steam pressure will be 575 p.s.i.g. and the steam temperature, 700°F. At low pressure steam flow will be 69.5 k. lb./hr., the steam pressure 145 p.s.i.g., and the steam temperature 670°F.

This 'double pressure' steam cycle has been adopted to improve turbine efficiency.

Turbo-generators: There will be 6 sets of turbo-generators per station. These will be of the multi-stage, axial flow, impulse-reaction type. The continuous maximum rating per set will be 60 MW.

Charge and Discharge Operations: The entire fuel charge and discharge operations for each reactor are designed to be carried out by a single multi-purpose machine working in a shielded chamber below the reactor. All operations can be carried out under pressure and while the reactor is on load. All movements will be remotely controlled.

Discharged radioactive fuel elements are to be retained within the machine during the re-charging process and later will be removed for separation of the graphite sleeves from the fuel cartridges, the latter to be stored in the 'cooling pond.'

The cartridge cooling pond will be situated between the two reactors and is common to both of them. It is to be divided unequally, the larger for storing normal discharged cartridges and the smaller for cartridges from channels in which a burst has occurred. Capacity of the 'cooling pond' will be such that the complete fuel charge from one reactor can be dumped within it in the event of an emergency, as well as the normal number of cartridges issuing from one running reactor.

Reactor Servicing Machine: This will take the form of a travelling pressure vessel situated above the upper biological shield of the reactor. Its primary purpose will enable planned maintenance operations to be carried out on the control rods and control rod mechanisms while the reactor is under load and pressure. This servicing machine will also carry out certain other operations of an emergency nature.

Burst Slug Detection Equipment: This will detect the escape of radioactive fission products due to failure of a fuel element and will locate the channel containing the faulty element so that the reactor and gas circuit may be safeguarded from the release of fission products.

Control and Instrumentation: A central control room in the turbine building will be provided with a comprehensive system of manual controls and appropriate instrumentation for the two reactors and their associated plant. The method of overall control between 25 per cent and 100 per cent full power will involve co-ordination variation of the neutron flux density, the coolant gas flow and the steam flow.

By means of automatic features, it is estimated that power reduction from 100 per cent to 33⅓ per cent full power can be carried out in a controlled manner in under 30 minutes.

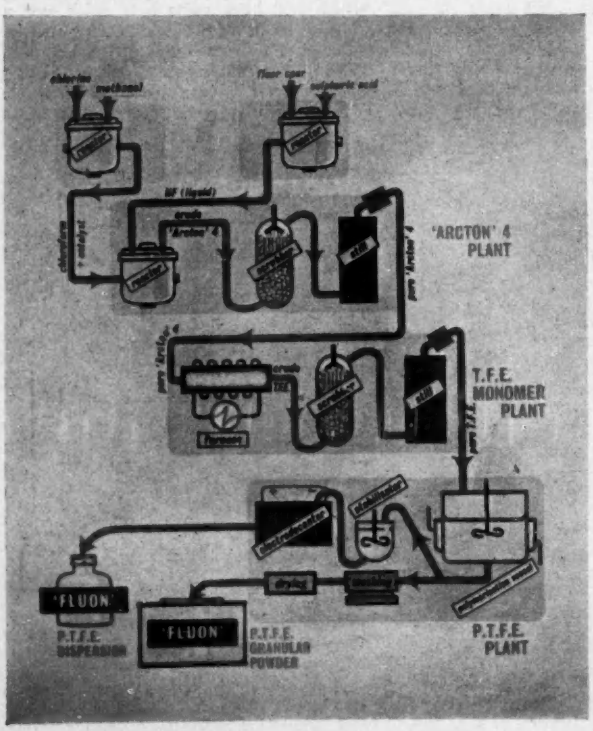
Safety Arrangements: A large number of alarms, both aural and visual, urgent and not-so-urgent are to be incorporated.

ICI Fluon on Show

AN EXHIBITION designed to show the applications of Fluon (polytetrafluorethylene) was held by Imperial Chemical Industries Ltd. on 30 and 31 January.

A number of users of ICI's material demonstrated their products which incorporate p.t.f.e.

Crane Packing Ltd., who have been users since 1946, were showing gaskets, seals and pump fittings made from p.t.f.e. A representative of the company described some of the difficulties in handling this comparatively new material. He said that parts machined to a particular shape tended to lose that shape unless allowance was made for flow properties.



Synthesis of Fluon (p.t.f.e.) from Arcton 4 refrigerant gas is shown in this flow diagram. Arcton 4 is manufactured from fluorspar, sulphuric acid and chloroform. It is pyrolised, when it splits into tetraflourethylene and hydrochloric acid. The monomer, which must be of the highest purity is polymerised under pressure in the presence of excess water to remove the heat evolved. Polymerisation is initiated by a water soluble catalyst capable of generating free radicals, e.g. a peroxide.

First Safety Course for Chemical Workers

FIRST COURSE for chemical workers organised by the Birmingham and District Industrial Safety Group, held on 16 and 17 January, was well attended by representatives of companies from all parts of Britain. Subject dealt with included the handling of chemicals, inflammable materials and explosives.

Those present were given practical demonstrations and detailed instructions on the storage and marking of containers. Other talks included the inspection and entry into vessels, the rules for carrying out plant repairs and pipe lines. Special sessions dealt with the proper use of protective clothing and the use of breathing apparatus.

Among lecturers were Mr. H. Stephenson and Dr. D. Matheson, chemical inspectors of factories; Mr. M. Bowes, safety officer, Henry Wiggin and Co. Ltd.; Mr. Heading, works manager, Henry Brotherton and Co. Ltd.; Dr. D. Duncan, works medical officer, ICI Metals Division; Mr. E. A. Kite, safety officer, ICI Chance and Hunt; and Mr. W. Etheridge of Courtaulds Ltd. technical department.

Further courses are planned in 1957 for 2 and 3 April and 5-6 November. Full details can be obtained from the manager of the Birmingham training centre at 22 Summer Road, Acocks Green, Birmingham 27.

US ARMY CHEMICAL CORPS

General Creasey Describes its Growth and Organisation

DURING the early days of World War II, it appeared likely that enemy saboteurs might try to infect beef and dairy herds of the North American continent with the disease rinderpest (also called Asiatic cattle plague) in an effort to cut down the Allies' food supplies. This scourge of cattle, which sometimes also takes its toll of humans, had never appeared on the American Continent.

To meet this threat, American, British, and Canadian scientists set up a joint laboratory on an isolated island in the lower St. Lawrence River. Working feverishly, they were able to develop an anti-rinderpest vaccine that was ready to protect the livestock in event of a disease outbreak. However, it did not have to be used. Since the war, this vaccine has helped to check rinderpest outbreaks in British West Africa and elsewhere on the African and Asian Continents.

Standards Agreement

There now exists a basic standardisation agreement among the armed forces of the US, UK and Canada to insure that there will be no operational, material, or technical obstacles to effective combined operations against a common enemy. As a part of this agreement, scientists of the UK and US who are engaged in perfecting their nations' defences against the toxicological munitions of chemical and biological warfare have met annually for the past 11 years to exchange ideas, information and data. At these meetings, specific fields of research and development are examined and assignment for future work is made on a country-wide basis, thus eliminating duplication of methods of attacking given problems and enabling better use of funds and technical personnel.

For instance, scientists of the US Army Chemical Corps today are working on a development idea that originated with an English industrial scientist and which could be of inestimable value. The idea (which must remain, at the moment, unidentified in the interests of security) was passed on to the British Ministry of Supply, whose scientists did considerable exploratory research work on the idea before turning the project over to the American scientists. This action was taken because further work in England would have entailed the construction of expensive facilities and a possible delay in further development, while the necessary facilities were already in-being in the US Army Chemical Corps.

While both nations are working cooperatively toward a common objective —adequate defence against chemical and biological warfare — their methods of operation are somewhat dissimilar.

Basically, this difference is in the area of operational management. In the UK, the Ministry of Supply — through its civilian-managed establishments — is the responsible agency for the necessary research and development on chemical and biological warfare in accordance with the requirements of the various service ministries and the Home Office. The military personnel involved are there mainly to see that the service aspects of new items are attained. In the US, this work is the sole responsibility of a military agency, with uniformed and civilian scientists and technicians working as a combined team.

In generalised terms, the mission of the US Army Chemical Corps is to study, develop, and supply the means — including specialised training — for defence against the weapons of chemical, biological, and radiological warfare; and, in the case of chemical and biological warfare, to provide the capability for retaliatory operations on a weapon-for-weapon basis, if necessary. However, the term 'chemical warfare' is somewhat elastic and includes not only work in the field of toxic chemical agents (gas warfare), but also flame warfare and the military use of smokes and pyrotechnics. (Between its inception during World War I and the end of World War II, the organisation was called the Chemical Warfare Service; in 1946, it became the Army Chemical Corps).

The Chemical Corps is one of the seven technical organisations (chemical, engineers, signal, ordnance, quartermaster, medical, and transportation) which come under the Army Deputy Chief of Staff of Logistics. This officer reports directly to the Army Chief of Staff and also to the Assistant Secretary of Army Logistics, who is a civilian.

Although an army organisation, the Chemical Corps serves the entire Department of Defence (Army, Navy and Air Force) as well as the Federal Civil Defence Administration and the US Public Health Service in matters relating to its mission.

In some respects the Chemical Corps is more of an industrial-type organisation than a military agency, and civilian employees outnumber the uniformed personnel by about four to one in three of its four sub-organisations. The office of the chief chemical officer, located in Washington, DC, is relatively small and serves as an administrative office for the Corps It passes down only long-range guidance, funding limitations, and policy to its four operational organisations: the Research and Development Command, the Engineering Command, the Material Command, and the Training Command. These four sub-organisations are autonomous for their day-to-day operations in performing their specific portions of the Corps' over-all mission. Only the Training Command is strictly a military agency in regard to its work and personnel.

Development Work

The Research and Development Command, which is headquartered also in Washington, carries out the investigations, studies and tests which lead to new and improved items of equipment or munitions in the fields of chemical, biological, and radiological (defensive items only) warfare, through its four principal activities: the Chemical Warfare Laboratories at the Army Chemical Centre (Edgewood), Maryland, where work in

MAJOR-GENERAL W. M. CREASEY, author of this article written specially for Chemical Age is the Chief Chemical Officer of the US Army. He joined the US Chemical Warfare service (redesignated the Chemical Corps in 1946) in 1929 after previous service in the Air Corps and Artillery. After periods at the Chemical Warfare School, Scholfield Barracks, Hawaii, & Edgewood Arsenal, he entered Massachusetts Institute of Technology, from which he received an M.Sc. degree in chemical engineering practice. In 1937 he became chief of the engineering division at Edgewood Arsenal and later was appointed chemical officer for the IX Corps. In 1940 General Creasey went to Hawaii in command of the First Separate Chemical Battalian. He was the first chief of the Pine Bluff Arsenal production division.

After a number of wartime administrative posts in various theatres he was appointed, in October 1946, to the research and development division of the War Department General Staff. In July 1947, he became deputy director for research and development and in May 1948 became chief of the research and engineering division of the Chemical Corps with headquarters at the Army Chemical Centre at Edgewood, Ma. In October 1951 he assumed command of the newly created Chemical Corps Research and Engineering Command and of the Army Chemical Centre. He became Chief Chemical Officer, US Army in May, 1954.

the chemical warfare — including necessary medical research in this field — and radiological defence areas is carried out; the Biological Warfare Laboratories at Fort Detrick (Frederick), Maryland; Dugway Proving Ground, just south of the Great Salt Lake in Utah, where the major test work is done; and the Process Development Laboratories at Pine Bluff Arsenal, Arkansas, where the manufacturing process for certain munitions are worked out.

To a degree, the Chemical Warfare Laboratories and the Biological Warfare Laboratories can be likened to the Ministry of Supply's Chemical Defence Experimental, and the Microbiological Research Establishments at Porton in southern England.

Also located at the Army Chemical Centre is the Engineering Command, smallest of the Corps' four sub-organisations. This agency provides the essential engineering services necessary in the research and development, and the manufacturing or procurement operations. In so doing, the command's personnel help build engineering and mass production validity into a new item during the development stage, and then carry through into the manufacturing phase to recommend any necessary changes for greater production efficiency.

Material Command

The Material Command also has its headquarters at the Army Chemical Centre. This organisation is responsible for operating the Corps' several manufacturing arsenals, for procuring and supplying to the armed forces the items developed by the Corps, and for planing with industry for the mass production of the Corps' needs in time of national emergency. Activities under the Material Command include manufacturing arsenals in Maryland, Alabama, Arkansas, and Colorado; five major procurement districts with headquarters in Atlanta (Georgia), Dallas (Texas), San Francisco (California), Chicago (Illinois), and New York City (which also has a sub-office in Boston, Mass.); three major supply depots in the eastern, midwestern, and western sections of the US; supervisory control over the chemical sections of a number of army general depots; and the responsibility for maintaining a number of the Corps' manufacturing plants, which are leased out to private industry during peacetime, in a ready stand-by condition in case they are called upon to manufacture war material.

During peacetime, the Material Command comes second to the Research and Development Command in the Corps' operation, its main task currently being to plan with industry for any necessary rapid turn-over to military production in case of national emergency. In time of war, however, it becomes the major operation. For instance, today a third of the Corps' annual budget of better than 100 million dollars goes into research and development work. But, during World War II there were times when this figure was less than five per cent of the budget, while the manufacturing, procurement, and supply activities took more than 50 per cent of the funds available.

The fourth of the Corps' operating agencies is the Training Command at Fort McClellan, Alabama. Its major function is the operation of the Chemical Corps School and its courses for members of all the Armed Services, and the training of the Corps' special troop units. Like the Material Command, the Training Command also operates under reduced conditions during peace years. Today, for instance, it has hardly more than a dozen troop units — such as smoke generator companies, which have been a frequent sight around airfields in England — while during 1941 to 1945, there were more than 200 troop units. Today, approximately a thousand officers and men attend the Chemical Corps School annually, but during World War II more than 86,000 people — military and civilian — were given specialised training. Undoubtedly, the UK's counterpart, the Joint School of Chemical Warfare near Salisbury, has experienced the same situation.

Throughout the Corps, with the exception of the Training Command, the military-civilian team concept of management is utilised. Of the four people immediately associated with the chief chemical officer, two are civilians, and so it is at all of the Corps' installations and major agencies: the military commander will have one or two civilians as deputies. On the actual operations levels, military and civilian personnel are freely intermingled as supervisory and working personnel. The Corps has found that this system pays dividends, especially in the research and development field. The civilian contributes the scientific or technical 'know-how' and the uniformed member of the team contributes the military perspective. In many cases, the military man is a scientist or technician in his own right.

Unique System

This system is also necessary because of the very nature of the Corps, it being a combination military-industrial organisation, and unique among the military. It is organised on the layer-style form of management usually found in industry, rather than the familiar military 'pyramid' chain of command. In many respects, the Corps bears a striking resemblance to an industrial organisation, such as a medium-sized chemical firm; for, while it performs a great deal of work purely of a military nature, it also has responsibilities that are purely of an industrial nature — research and development, engineering, and manufacturing, for instance.

As a result, the Corps has an extremely close association with the chemical and allied industries. Being one of the smallest of the army's major technical organisations, the Corps' facilities and manpower are somewhat limited. To overcome this situation, the Chemical Corps' in 1939, pioneered the idea of letting out military research and development contracts to civilian industry. This programme has since grown so that today about one-third of the Corps' research and development work is done by industry, hospitals, and universities with contracts ranging in scope from those costing a few hundred dollars and utilising the peculiar genius of individuals, to those costing hundreds of thousands of dollars.

Industry has also aided the Corps on a voluntary basis, bringing to its attention new information or ideas that are of military value. This is especially important when one stops to consider the fact that practically every war-gas known in the world today has been evolved from an idea or discovery made in an industrial laboratory rather than a military laboratory.

In general, the Corps begins a new research and development project only after first conferring with all its customers — the Army Field Forces, Navy, Marine Corps, Air Force, Federal Civil Defence Administration, and US Public Health Service — in order to ascertain whether the idea can be adapted for use by more than one of the 'customers.' After the item has been developed, tested, and accepted by the user services, the Corps usually takes on the responsibility for either manufacturing the item or procuring it from industry. For instance, all the Napalm — used to gel gasoline for flamethrowers and fire bombs — used by the American ground and air units in the Korean war was purchased by the Corps.

Examples of Work

The varied areas in which the Corps works can be seen from some of its recent developments: for the Navy, a new and more efficient floating smoke pot; for the Air Force, nitrogen dioxide transportation and handling equipment, and new revolutionary bomblet shapes; for the Marine Corps, a more effective mechanised (tank-mounted) flamethrower; for the Army, the 'baseball-type' tear gas grenade (about the size and weight of a cricket ball), and a new portable one-shot flamethrower that weighs about 26 lb. as compared with the older 72-lb. model; for the civil defence programme, a lightweight pocket-size protective mask (respirator) that does away with the bulky metal canister and protects the wearer against breathing-in toxic gases, germs, and radioactive dust; and by working with the US Public Health Service, it has shown the practicability of its biological warfare detection devices by tracing down sources of recent disease outbreaks.

The perfection of such items stems not only from the work done by the US Army Chemical Corps, but also from information and data exchanged with British scientists as a part of the co-operative programme to build the Free World's defences against all forms of warfare. For instance, just recently the Corps revealed the development of a portable detector-alarm for the nerve gases that will be useful to field troops and civil defence personnel in the event of toxicological warfare. Some of the development work done on this item was performed by the English counterparts of the scientists and technicians working in, and with, the US Army Chemical Corps.

TOXIC HAZARDS IN INDUSTRY—6

Agricultural Chemicals : By Peter Cooper, F.P.S.

MODERN agricultural pesticides include chemicals of remarkably high toxicity (e.g. the organic phosphorus insecticides and metabolic stimulants), against which rigid safety precautions must be taken at all stages of manufacture, formulation and packaging. Many of the older arsenicals, mercurials and halogenated insecticides remain moderately hazardous, although their noxious properties have tended to be overshadowed with the arrival of more potent drugs. In general, precautions should be taken against ingestion, inhalation or skin contamination, particularly where fine dusts, solutions in oily or hydrocarbon bases, or liquid compounds are concerned.

Nicotine, especially the free alkaloid, is absorbed very rapidly through the unbroken skin. A few drops of base or strong salt solution allowed to remain on the skin or clothing may prove fatal. Smokers acquire increased tolerance to nicotine, but non-smokers may react alarmingly to only a few milligrammes. This should be remembered when picking workers to handle bulk or laboratory quantities of the drug. The symptoms of poisoning are early nausea, vomiting, mental confusion, twitchings, giddiness, rapid pulse and overexcitability leading to convulsions and collapse. Minor symptoms include headache, irritability and insomnia, neuralgia and anxiety. The action of nicotine is diphasic. It first stimulates the central nervous system, then depresses it, endangering respiration. The pupils of the patient are first contracted, then expanded, and there are serious disturbances of vision. The lethal dose percutaneously is as low as 60 mg. (one drop), and less by mouth, for a healthy adult.

Nicotine Poisoning

Nicotine poisoning calls for immediate treatment, since death may occur after only three minutes. The stomach should be washed out with dilute permanganate solution, and activated charcoal given, if oral poisoning is likely. Contaminated clothing should be removed and the skin washed copiously with water. Heat should be applied to the body and cold packs to the head. Chloral hydrate or morphine is suitable for irritability or abdominal pain. Artificial respiration and oxygen inhalations may become necessary. Strychnine must be avoided, but intravenous atropine sulphate (1 mg.) may help to avert heart failure. Recovery is usually complete within 24 hours.

Calcium cyanamide in fertilisers may cause dermatitis of the extremities in those handling it in bulk. When inhaled or swallowed as dust it provokes circulatory reactions, with shortness of breath and insomnia. The action of cyanamide probably depends upon the liberation of HCN in the body, since the toxic symptoms are intensified after meals, when the stomach acid is greatest. Alarming symptoms should be treated as described under cyanides (Part 5, 12 January, p. 95).

Thallium salts, usually acetate or sulphate, are sometimes contained in rat or ant baits. They are well-known poisons, but are cumulative and therefore insidious, single doses remaining in the body for months. Subacute or chronic poisoning leads to dry, scaly skin, often with the loss of hair and even nails. There is a persistent metallic taste, and the mouth and gums are inflamed. Later, vomiting, diarrhoea and drowsiness are met. Acute poisoning causes severe chest pain with a rapid pulse and often hypertension, leading to mental changes. Albumin and blood appear in the urine, and calcium metabolism is upset. A dose of 500 mg. of thallium taken over a period of a few weeks may prove fatal. Following accidental ingestion, gastric lavage with 3$_{\frac{1}{2}}$ per cent sodium thiosulphate has been recommended. Sodium iodide, given by mouth and intravenously (0.5 to 1 G. daily) delays absorption of the poison. Saline cathartics and demulcents are indicated. Anaemia demands blood transfusions. Injections of dimercaprol (BAL) intramuscularly (300 mg. per day) are effective, provided they are administered in the early stages.

Rodenticide

Warfarin (3-α-acetonylbenzyl-4-hydroxycoumarine), a potent rodenticide, depends for its action upon its anticoagulant properties. It causes capillary damage and multiple haemorrhages. The chief danger of contact with Warfarin is the delay in effect; a single dose needs four days to produce results. Poisoning is shown by persistent bleeding after small abrasions, and an increase in blood clotting-time. As poisoning develops the sputum and faeces may become blood-stained. Phytonadione (Vitamin K_1) may be given intravenously in emergency haemorrhage, and exerts an antidotal effect in three hours, reaching a maximum in six. Normally, the drug may be given orally in drops or capsules until the prothrombin-time becomes normal again. In serious cases, transfusions of whole-blood may be needed. The patient should be kept quiet and resting.

ANTU, (1-(1-naphthyl)-2-thiourea), another rodenticide of relatively low toxicity for humans, causes massive pulmonary oedema with pleural effusions. It is mildly emetic, and produces shortness of breath, a fall in body temperature, alterations of hair growth and pigmentation and a marked rise of blood-sugar. Accidental doses should be treated with gastric lavage and saline cathartics, and by rest in a recumbent position. Oxygen inhalations are useful. There is experimental evidence that cysteine (an amino acid) will reduce the toxic effects of ANTU.

Fluoroacetates are very toxic to man, a dose of 50 mg. being capable of causing death within five hours. There is a latent period of half to two hours before symptoms appear, then cardiac irregularities and signs of central nervous stimulation arise. Once initiated, the symptoms progress rapidly. Tingling of the nose and numbness of the face spread to the limbs, and there are muscle spasms, epileptiform convulsions, ventricular fibrillation and cardiac arrest. The patient must be kept at absolute rest until the symptoms subside. Ingested fluoroacetate is treated with emetics, gastric lavage with limewater, chalk suspension or milk, and saline laxatives (half an ounce of magnesium sulphate in water). Slow intravenous infusion of calcium gluconate is effective. Short-acting barbiturates (e.g. sodium thiopentone) control the convulsions, and 10 per cent procainamide intravenously serves to prevent cardiac fibrillation. Intramuscular injections of sodium glycerol monoacetate (0.25 G. per lb. weight), given in several sites, are claimed to be specifically antidotal.

Powerful Stimulant

DNOC (4,6-dinitro-o-cresol), with its herbicidal and insecticidal congeners, is a powerful metabolic stimulant. It is absorbed into the body by all routes. Inhalation of only 5 p.p.m. of DNOC dust over several weeks has proved fatal. Its effects are loss of weight, increase in nasal metabolic rate and respiration, and rise in body temperature. The yellow stain on the skin is seen long before any toxic quantity has been absorbed. Sweating is a characteristic sign of exposure, associated with anxiety, a pounding heart, severe thirst, shortness of breath and chest pain. Cataract of the eyes and liver and kidney damage are common features of poisoning. The condition is confirmed by measuring the blood-level of DNOC in the patient; more than 30 mcg. per ml. represents a toxic level. The urine is usually greenish-yellow.

Ingested DNOC demands emetics, gastric lavage and saline cathartics. Oils must never be given, since they increase absorption of the poison. Absolute rest is essential, with cold-sponging and active ventilation to reduce the fever. Artificial respiration and oxygen inhalations may be called for. After recovery, further exposure to metabolic stimulants must be avoided for at least two months, until the blood-concentration of DNOC has fallen to 5 mcg. per ml.

The chlorinated compounds, dicophane (DDT, 1,1,1-trichloro-2,2-bis(p-chlorophenyl)ethane) and hexachlorocyclohexane (BHC), are readily absorbed by all routes, but are much less toxic than the organic phosphorus insecticides. With dicophane, central nervous symptoms may appear within an hour. Nausea, vomiting and diarrhoea are accompanied by anxiety, giddiness, somnolence and tingling of the extremities. With large doses, delirium, convulsions and respira-

tory failure may follow. BHC causes irritability with nausea, vomiting and diarrhoea, and local skin irritation. Serious cases develop abdominal pain, convulsions and respiratory failure. Barbiturates are used in either case to control the convulsions, and the patient is nursed quietly and given a low-fat, high protein and carbohydrate diet. No oils must be given, for they increase the absorption of the compounds, and adrenaline must be avoided, since it increases the liability to ventricular fibrillation.

Chlordane and toxaphene are considerably more toxic than DDT or BHC, and are absorbed through the skin. They both irritate the gastro-intestinal tract and are central nervous system stimullants. Chlordane causes loss of appetite and weight, with hyperexcitability, tremors, convulsions and respiratory depression. Toxaphene provokes nausea, vomiting and diarrhoea within an hour, and later epileptiform convulsions, internal haemorrhages and fever. If the compounds are swallowed, emetics and gastric lavage are given. Contaminated skin is washed with soap and water. Convulsions are controlled with barbiturates. Steps must be taken to protect the liver and kidneys. No oils must be given, since they increase the absorption of the compounds and aggravate the symptoms.

Great Toxic Hazard

The organic phosphous insecticides hexaethyltetraphosphate (HETP), tetraethylpyrophosphate (TEPP), diethyl-p-nitrophenyl thiophosphate (Parathion) and octamethyl pyrophosphoramide (OMPA) present a great toxic hazard to all who handle them. Their lethal doses are in the region of 15 mg., and they are absorbed by all routes. Their percutaneous absorption is facilitated by formulation with wetting agents or hydrocarbon solvents. Death from severe poisoning may occur within four hours—sometimes ten minutes. All are anticholinesterases and produce symptoms derived from excessive parasympathetic activity of the nervous system. These include loss of appetite, nausea and vomiting, purging and salivation. Headache, giddiness, loss of the power of distant focusing and depth perception, and blurred vision are followed by chest pain, shortness of breath, general weakness, excessive sweating, cyanosis, convulsions, coma and respiratory failure. The pupils of the eyes are narrowed to pinpoints.

Clothing contaminated with these organic phosphorus insecticides must be removed immediately and the skin well washed with soap and water or sodium bicarbonate solution. Swallowed spray or powder must be removed with emetics and stomach lavage. The physiological antidote, atropine, must be given in large doses (1 to 2 mg. hourly, up to 20 mg. on the first day of poisoning), the first doses being given intravenously and later ones subcutaneously. Morphine must not be given for the pain, since it increases the respiratory hazard. Artificial respiration may be necessary, and oxygen inhalations. The emergency lasts for 24 to 48 hours, and full atropine dosage must be maintained during the whole of the critical period. The patient must be watched continuously for respiratory failure.

A routine estimation of serum cholinesterase is the most effective check on workers handling anticholinesterase drugs. A rapid method has been devised, using papers impregnated with acetylcholine bromide and bromothymol blue. These are light orange when dry, but when a drop of serum is applied the indicator turns blue in the presence of the esterase, the colour being compared with a standard series of papers.

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Miller Insulation Open New Glasgow Offices

MODERN OFFICES have been opened by Miller Insulation and Engineering Ltd. of Glasgow, at Northinch Street, Glasgow. The company, formed originally to undertake marine insulation work, has been developing steadily in the land side of the business and particularly in the servicing of the chemical and petroleum chemical industry.

Miller have completed a considerable number of major contracts at Grangemouth, Middlesbrough, and elsewhere, for leading chemical processing firms within the past 10 years and is planning further development in this field with special interest in chemical and petroleum chemical engineering.

Pvc-bonded Steel Strip to be shown at Open Days

DEMONSTRATIONS of the experimental line recently installed at the Sketty Hall, Swansea, laboratories of the British Iron and Steel Research Association, for the production of p.v.c. bonded steel strip will be given on the two open days on 20 and 21 June. Other developments to be seen will be the differential roller tinning pilot plant now being built; the continuous lacquering of steel strip; the use of iron-zinc and iron-tin alloys; and research into methods of gaseous deposition of metallic coatings.

The Sketty Hall laboratories are devoted to research into problems concerning steel coatings and methods of surface preparation conducted by the BISRA mechanical working division.

MORE SULPHURIC ACID USED LAST YEAR

SUMMARY of monthly returns issued by the National Sulphuric Acid Association for last year show that UK consumption of sulphuric acid and oleum at 2,248,496 tons of 100 per cent H_2SO_4 was 127,169 tons higher than the 1955 figure.

Production of sulphuric acid from oleum (chamber, tower and contact) in 1956 totalled 2,251,180 tons of 100 per cent H_2SO_4, an increase of 154,034 tons over the previous year.

SULPHURIC ACID AND OLEUM

(Tons of 100% H_2SO_4)

	Chamber & Tower only	Contact only	Chamber, Tower & Contact
Stock at 1/1/56 ...	24,891	48,263	73,154
Production	546,026	1,705,154	2,251,180
Receipts	107,750	142,442	250,192
Oleum feed ...	—	5,844	5,844
Adjustments ...	−2,276	+3,680	+1,404
Use	367,713	817,176	1,184,889
Despatches ...	279,421	1,014,116	1,293,537
Stock at 31/12/56 ...	29,257	74,091	103,348
Total capacity represented ...	781,370	2,003,930	2,785,300
% production ...	69.9%	85.1%	80.8%

UK CONSUMPTION OF SULPHURIC ACID AND OLEUM

Trade Uses	Tons 100% H_2SO_4 1955	1956	Percentage of Total 1956
Accumulators ...	10,941	10,391	0.46
Agricultural purposes	5,035	7,334	0.33
Bromine	12,168	12,240	0.54
Clays (Fuller's Earth, etc.)	11,447	10,859	0.48
Copper pickling ...	3,127	3,013	0.13
Dealers	13,795	12,750	0.57
Dichromate & chromic acid	15,618	16,116	0.72
Drugs & fine chemicals	18,708	16,699	0.74
Dyestuffs & intermediates	81,461	76,597	3.41
Explosives	28,865	20,292	0.90
Export	3,791	4,412	0.20
Glue, gelatine & size	392	468	0.02
Hydrochloric acid ...	61,545	61,200	2.72
Hydrofluoric acid ...	11,375	12,756	0.57
Iron pickling (inc. tin plate) ...	117,574	120,040	5.34
Leather	5,031	4,840	0.22
Lithopone	16,818	15,992	0.71
Metal extraction ...	4,342	3,643	0.16
Oil refining & petroleum products	60,595	62,546	2.78
Oils (vegetable) ...	11,232	8,905	0.40
Paper, etc.	7,428	6,517	0.29
Phosphates (industrial)	617	509	0.02
Plastics, n.e.s. ...	34,989	39,702	1.77
Rayon & transparent paper	260,639	268,233	11.93
Sewage	11,016	10,031	0.45
Soap, glycerine & detergents ...	42,705	76,863	3.42
Sugar refining ...	616	826	0.04
Sulphate of ammonia	284,602	299,824	13.33
Sulphates of copper, nickel, etc. ...	20,426	26,758	1.19
Sulphate of magnesium	2,120	1,192	0.05
Superphosphates ...	490,996	520,050	23.13
Tar & benzole ...	23,231	24,857	1.10
Textile uses ...	19,141	18,969	0.84
Titanium dioxide ...	231,752	273,646	12.17
Unclassified ...	197,189	199,426	8.87
Total ...	2,121,327	2,248,496	100.00

RAW MATERIALS

(Tons)

	Pyrites	Spent Oxide	Imported	Sulphur Recovered H_2S & Filter Cake	Zinc Concentrates	Anhydrite
Stock 1 Jan. 1956	203,322	124,967	54,964	8,656	74,569	14,132
Receipts	395,372	271,351	280,989	36,273	179,938	699,567
Adjustments	+12,951	+2,090	−1,106	−17	+646	−6,453
Use	393,696	252,224	261,599	32,410	187,933	697,732
Despatches*	7,929	15,939	2,397	527	4,813	—
Stock 31 Dec. 1956	210,020	130,245	70,851	11,975	26,407	9,514

* Including uses for purposes other than sulphuric acid manufacture.

EQUIPMENT REVIEW

Chemical Plant : Laboratory Apparatus Safety and Anti-Corrosion Products

REMOTE HANDLING EQUIPMENT

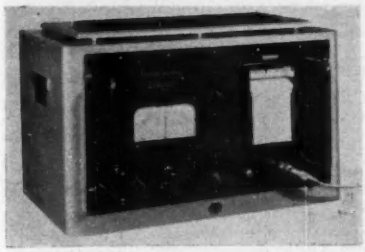
THE MODEL SP8 Master Slave Manipulator, developed by Savage and Parsons Ltd., Watford, Herts, in collaboration with the Atomic Energy Research Establishment, Harwell, is now available for the first time to commercial users.

The equipment, which is described in a new publication, No. 7/5, makes possible the remote control, through protective screens several feet thick, of complex operations on highly radioactive or toxic materials. It is claimed that the manipulator will perform all tasks normally requiring human hands, from lifting a delicate piece of apparatus to moving weights, in an emergency, of up to 20 lb.

The leaflet, which is available from the company on request, also includes a detailed performance specification and a drawing which gives all necessary dimensions.

LABGEAR RECORDING RATEMETER

A RECORDING ratemeter, D 4124, exhibited as a prototype at the 1956 Physical Society Exhibition, is being produced by Labgear (Cambridge) Ltd., Willow Place, Cambridge. Designed to indicate and record the regular or random rate of pulses arriving at the input and furnish signals, for the purpose of warning or process control, when a deviation in rate



Labgear recording ratemeter

outside preset limits is exceeded, the ratemeter gives both a meter indication and a paper record.

Four ranges of count-rate, up to a maximum of 600,000 per minute, to an accuracy of better than one per cent are claimed. This degree of accuracy is obtained by the use of a diode-pump type of circuit embodying automatic compensation for counts lost in a random distribution of pulse input, as compared with regularly spaced pulses.

The instrument is designed to operate from pulses originating from all types of detectors and is equally applicable to nuclear and industrial applications.

TEFLON SEATED GATE VALVE

JOSHUA HINDLE and Sons Ltd., of Hindle House, Neville Street, Leeds 1, have recently introduced a new design in their Teflon seated Fullway gate valve.

In addition to the normal precision fit of the metal to metal contact of the wedge and seat, this new valve incorporates a pair of Teflon packing seals which press tightly against the wedge forming an impassable seal. The corrosion resistance of Teflon is said to ensure a leakproof shut off in all conditions for which Teflon is suitable.

The Teflon seat rings can be changed within a few minutes without taking the valve out of the line. Complete replacement of the seats involves the use of a spanner only.

PYRENE FIRE EXTINGUISHER

A SPECIAL-PURPOSE fire extinguisher, being marketed by The Pyrene Co. Ltd., 9 Grosvenor Gardens, London SW1, is designed to meet the problems associated with fire outbreaks involving such metals as sodium and calcium, or magnesium and aluminium in the form of powder or swarf.

Known as Model PDMU 25, the new extinguisher is charged with 25 lb. of dry chemical powder which is discharged under pressure provided by a cartridge of CO_2 gas. The dry chemical powder is applied to the burning metal by means of a specially-designed applicator comprising a long tubular metal extension terminating in a cone-shaped spreader. The applicator ensures that the discharge of dry chemical powder is delivered lightly on to the fire in order to prevent the danger of scattering which is associated with this class of fire.

Speedy operation is effected by removing the safety clip, detaching the applicator and striking the top of the extinguisher. A 'squeeze-grip' control valve enables the flow of dry chemical powder to be shut off at will and to be used to its fullest advantage.

E-MIL OIL IMMERSION BOTTLE

AN E-MIL oil immersion bottle, comprising two bottles for cedar oil and xylol, has been added to the range of laboratory glassware made by H. J. Elliott Ltd., Treforest Industrial Estate, Glam. The inner vessel, tapered for the application of the xylol, is made of E-Mil low actinic amber glass for the protection of the immersion oil. It is provided with two indentations for the removal of excess oil from the solid glass oil dropper.

The inner vessel is inserted into a specially adapted E-Mil Alkathene brand of yellow polythene closure, which is said to be interchangeable, leak proof, and can be locked by twisting for non-spill storage. The immersion oil dropper is fitted into a red plastics cap that fits into the top of the yellow stopper. Height is 14 cm. (5½ in.); broad base diameter is 7 cm. (2¾ in.); approximate capacity is 30 ml. xylol and 6 ml. immersion oil.

TEN-FIFTY CHECK MASTER

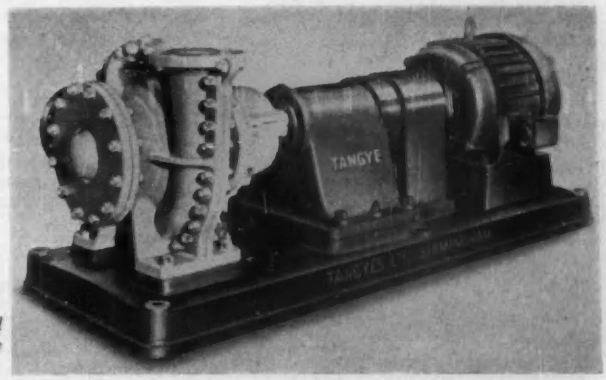
A MULTI-PURPOSE precision bench comparator, known as the Ten-Fifty check master, has been introduced by British Indicators Ltd., Sutton Road, St. Albans, Herts.

The main body of the instrument is a rigid box section casting of close-grained cast iron in which is mounted a frictionless transmission unit. In use, the transmission is in contact with the dial indicator by means of an adjustable datum stop. Suitable gauging pressure is provided by a tension spring inside the body attached to the transmission unit, provision being made for the reversal of this pressure when changing from external to internal checking.

HARD LEAD ACID PUMPS

PRIMARILY intended for dealing with hot dilute sulphuric acid solutions, the hard lead acid pumps manufactured by Tangyes Ltd., Cornwall Works, Smethwick, Birmingham, are also claimed to be suitable for handling many other corrosive liquids.

The pump is of the double suction inlet type and has a hydraulically balanced impeller under all conditions of pumping head. The vertical split casing provides easy accessibility for the correction of internal wear. The driving shaft is



Hard lead acid pumps made by Tangyes Ltd.

carried in an independent headstock. This and the pump are secured to a common bedplate of cast iron.

Output ranges from 50 gallons to 1,800 gallons of liquid per minute and heads up to 80 ft.

SHARPLES SUPER CLASSIFIER

A NEW TYPE of powder classifier, the Sharples super classifier, announced by Sharples Centrifuges Ltd., Tower House, Worcester, Stroud, Gloucester, is claimed to be an ideal air vortex type classifier.

The manufacturer states that cutpoint sharpness is not affected by throughput or size distribution of the feed. Fine fractions with a top size in the range of 15-20 microns will, it is claimed, contain less than 0.01-0.04 per cent 325 mesh screen residue.

Sharples' powder classifier

Product recovery is said to vary from 80 per cent to over 90 per cent, depending on product requirements. The efficiency of the super classifier is also said to be unaffected by changes in throughput rate or size distribution of the feed.

Designed to operate continuously without adjustment, the machine is available in a range of standard sizes and capacities, from 250 lb./hr. to 10 tons/hr.

TEDMAN CENTRIFUGAL SEPARATOR

THE TEDMAN SEPARATOR, for sand classification and mineral concentration in the size range 0.1 to 3 mm., is being marketed by Vickerys Ltd., Chemical and Mining Division, 4 Lambeth Palace Road, London SE1. There are no moving parts, hydraulic water being used to separate the feed solids into two sized or sorted products.

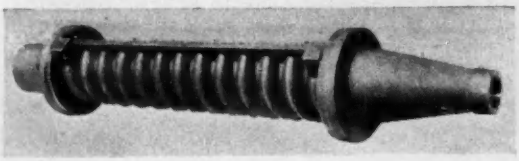
It consists of a cylindrical vessel with its inner wall formed as a helical groove. Each turn of the helix has a tangential jet for the inlet of slurry or water. At each end of the helix is an axial outlet cone for the discharge of the separated particles and water. Each outlet cone is arranged so that the size of the discharge orifice may be changed to divide the liquid phase between the two ends in widely varying proportions.

The separator is mounted horizontally. Slurry enters through two or more of the tangential jets in the helical groove. The solids are centrifuged to the wall of the groove and follow the groove for one or two turns. At this stage they become exposed to a boundary current set up by the tangential water jets. This boundary current rotates in the same direction as the slurry, but moves axially in the opposite direction. Small or low s.g. particles are carried back by the boundary current. They emerge at the fine fraction or tailings conical outlet, either thickened or with the bulk of the water. The coarse or mineral concentrate fraction carries on along the groove and emerges at the opposite outlet, thickened or with the bulk of the water as desired.

The strength of the boundary current decides the point at which a particle size or ratio or concentration is made. The strength of this current is controlled by the applied water pressure.

A cut in the range of particle size may be made by changing the pressure ratio between the slurry and the water. Where s.g. differences exist in the solids, for example mill tailings, high ratios of concentration can be achieved.

Slurry and water pressure used in the operation of this equipment are low and the maximum groove velocity is about 12 ft./sec. As a result abrasion wear is said to be negligible.



The Tedman separator which has no moving parts

REGAVOLT VARIABLE TRANSFORMER

THE rotary Regavolt variable transformer produced by The British Electric Resistance Co. Ltd., of Queensway, Enfield, Middlesex, was originally designed for industrial applications.

As a result of interest shown by research establishments and technical colleges, the company has now introduced a laboratory model. Designed for safe and simple operation, it is available in 200 and 540 VA sizes, 115 or 250 volts. The company states that it provides a fine voltage and current control and, as the output is fused, it is virtually fool-proof.

RADIOACTIVE CHROMATOGRAPH SCANNER

The automatic radioactive chromatograph scanner announced by The Forro Scientific Co., 833 Lincoln Street, Evanston, Illinois, is designed to provide an accurate graphical presentation of the activity distribution along a paper chromatogram tagged with low energy beta-emitting isotopes.

It employs a small flow counter with low background and can accommodate chromatograms up to three in. wide and five ft. long. The instrument is claimed to be the only scanner which can be operated without window, increasing its sensitivity for C-14, S-35, H-3 etc. considerably.

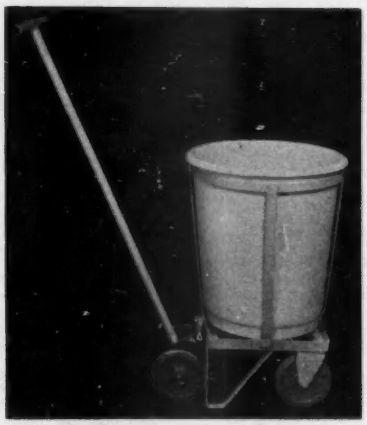
In its design care was taken to facilitate an easy decontamination of all parts in contact with the chromatogram. The scanning-head can be easily removed and subjected to any decontamination procedure. When used with window, contaminated windows can be quickly exchanged.

The recorder has the advantage of a rectilinear chart and the convenience of selecting 10 different scanning speeds by setting a lever. Chart and chromatogram speeds are always identical, facilitating the reading of the result by alignment of chromatogram with recorder chart.

Scanning is automatically interrupted when reaching the end of the chromatogram and a sound signal given to alert the operator. The instrument weights 32 lb. and has a convenient carrying handle.

TANSLEY'S 'KWIKWAY' TRUKBIN

A MOBILE storage bin, known as the 'Kwikway' Trukbin, is being made by Tansley Bros. Ltd., Standard Works, Mill Lane, Kidderminster.



The 'Kwikway' Trukbin

The bin can be converted into an articulated truck by application of the bogie. The bogie is wheeled under the front of the bin so that its swivel cup engages with the lug on the bin. The legs of the bin are raised by pulling forward the bogie handle.

In addition to the standard models, many different types and sizes are made to order. The illustration shows a Trukbin made up with a polythene bin for transport of powdered and granulated chemicals in bulk.

SHAW MOISTURE MONITOR

THE LATEST addition to the range of moisture meters made by J. L. Shaw Electronics Ltd., 31 Market Street, Bradford, Yorks, is the Shaw moisture monitor, claimed to be the first VHF continuous indicating moisture meter.

Continuous indication of moisture in granular, powdered or fibrous materials, during manufacture, is said to be possible with this instrument. Designed to

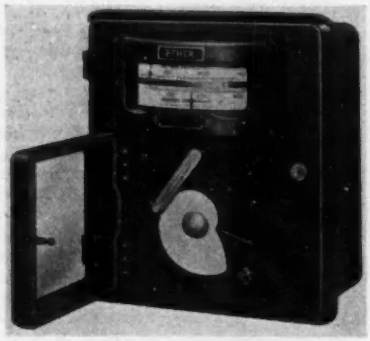
operate without attention, the monitor is said to need no standardising or correcting. It has a range of 0-100 per cent moisture content.

PROGRAMME TEMPERATURE CONTROLLER

SELF-CONTAINED instrument which indicates and controls temperature to close accuracy over a wide range in accordance with a pre-determined time programme, is being produced by Ether Ltd., Tyburn Road, Erdington, Birmingham 24.

Known as the Transitrol programme temperature controller type 994, it can also control any process where the signal can be converted into a direct current or voltage. It is used mainly for controlling the heating and cooling cycle of a furnace-load and its operation is such that the load is automatically heated at a pre-determined rate, held at the soaking temperature for a given time, and then cooled as required.

The instrument combines an indicating temperature-control unit with a time/temperature programme unit. Both units are housed together in a robust welded-steel case which is fully sealed against dust and moisture and is suitable for wall or panel mounting. The indicating unit is situated above the programme unit to enable the operator to maintain a visual check on the indicator while the programme is being set. Electrical connections to control-relay, thermo-couple and mains supply are evenly distributed inside the case.



Programme temperature controller by Ether Ltd.

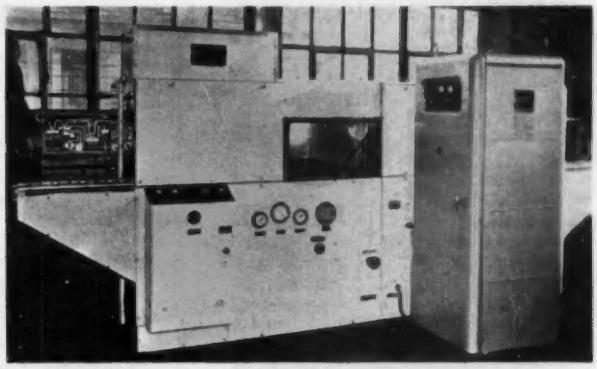
The unit operates on a transistor, thus eliminating the need for thermionic valves, magnetic amplifiers and oscillator circuits. It incorporates a conventional galvanometer, used as the measuring system, and an indicating-pointer which operates a simple photo-electric system and controls the heating medium.

ULTRASONIC CLEANING PLANT

A HIGH frequency ultrasonic cleaning plant is being produced by Kerry's (Great Britain) Ltd., Warton Road, Stratford, London E15. Articles to be cleaned are loaded into containers which pass into a pre-wash tank. This serves to loosen and remove gross contamination.

They then travel to the ultrasonic section and halt directly over a multiple transducer array of rectangular barium titanate plates. The dwell period can be varied by a calibrated dial between two seconds and two minutes.

Kerry ultrasonic cleaning plant

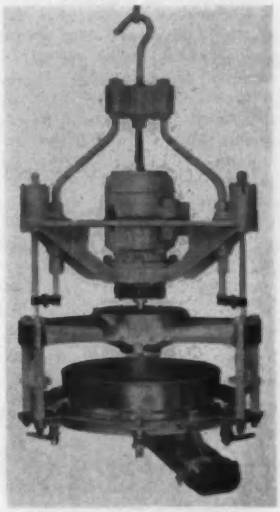


The ultrasonic tank is supplied with clean filtered solvent which circulates at 400 gallons per hour. Multiple filters are included in the pumping circuit and remove particles down to one micron. The solvent is constantly replaced by redistilled fluid so that the finer particles below one micron are removed together with oil dissolved from the cleaned articles.

The containers then proceed to a vapour still where the temperature of the articles is raised so that as they emerge through the cool zone of the still the solvent evaporates and the containers are automatically off-loaded from the conveyor with the contents clean and dry.

POWER CORRECTION CAPACITORS

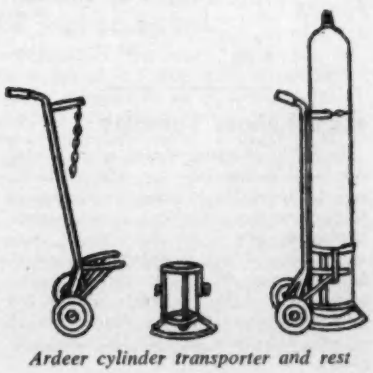
A POWER factor correction capacitor impregnated and filled with a non-inflammable liquid is being produced by Dubilier Condenser Co. (1925) Ltd. The complete equipment, including non-inflammable capacitor units, electrically operated contactors, power factor control relay and interlocked main isolating switch, is built in a steel cubicle. The arrangement, based on unit construction, is very flexible enabling installations to be 'tailor made'.



High speed strainer shown by Russell Constructions Ltd. at the packaging Exhibition (see CA, 26 January, p. 156)

Engineers Devise Cylinder Transporter

THE OLD problem of transporting nitrogen cylinders has been solved by adapting the principle of the modern mobile golf caddie. Credit for this ingenious solution goes to the Ardeer engineering department of the Nobel Division of ICI Ltd. The division's research department, whose staff manhandles many of these 1½ cwt. cylinders in the course of the year asked Mr. R. J. McD. Maxwell, chief physiotherapist at Ardeer to look at this problem.



Ardeer cylinder transporter and rest

The engineering department, which had already devised a drum transporter—now being commercially produced by a handling equipment specialist—designed the Ardeer cylinder transporter. The cylinder rests on the transporter much as a golf bag rests on a caddie-car. The rest is firmly attached to the cylinder, but can easily be removed.

A simple drill has been evolved for fixing the rest to the cylinder and the transporter to the rest. Reporting this new development, *Nobel Times*, the division's own newspaper, says that extended trials in the research laboratories have proved its worth.

Change of Address

Whiffen and Sons Ltd., the industrial and pharmaceutical division of Fisons Ltd. have moved to Fison House, 95 Wigmore Street, London W1 (Welbeck 5500).

HARWELL'S NEW HEAVY ELEMENT ATOM SEPARATOR NOW OPERATING

THE heavy element and radioactive material electromagnetic separator Hermes, which can separate groups of slightly different atoms from the mixture of twin-like atoms (or isotopes) of which a single element is usually formed, has now begun to operate at Harwell.

Groups of chemically identical atoms are separated from one another in the machine by accelerating a beam of electrically charged atoms through regions where electrical and magnetic forces cause groups of them differing slightly in weight to follow different paths through the machine.

The machine and its ancillary equipment give separate radioactive isotopes, and it is consequently specially designed to handle highly toxic and radioactive materials. It is the largest and most complex machine in western Europe yet built into a sealed space in which poisonous and radioactive materials can be handled in complete safety. Servicing and maintenance of the machine is carried out by skilled 'frogmen' in heavy rubber suits, who enter through a corridor.

Investigation of the fundamental nuclear properties of separated radioactive isotopes is of great importance, not only in extending present knowledge of nuclear physics, but also in providing data often vital for the development of advanced reactor technology. Hermes will be used, for example, to assist the precise measurement of the nuclear properties of the various types of plutonium which may be generated in a nuclear reactor. It is capable of separating isotopes of plutonium in milligram range quantities, and may be used to separate radioactive isotopes of other elements.

Principal contractors were: Honeywell Brown Ltd., supply of temperature regulating equipment; English Steel Corporation Ltd., supply of magnet; London Transformer Products Ltd., supply of magnet coils; Western Detail Manufacturers, manifold vacuum tank; Pressed Steel Co. Ltd., supply of refrigerating equipment; A. and E. Lintott Ltd., supply of control desk; The Pyrene Co. Ltd., supply of CO_2 installation; The Power Centre Co. Ltd., supply of trunking; Pilkington Brothers Ltd., supply of plate glass for dry box;; W. G. Pye and Co. Ltd., supply of closed loop television; Turner Ernest and Co. (Salford), Ltd., supply of metering instruments; Ediswan Valve Co., triode regulators; S.T.C., diode monitors and rectifier valves; Thos. Headland, Dzus fasteners; Lockheed Co., special couplers; Steatite and Porcelain, special insulators.

Correspondence

'Remove Incentive to Migrate by Paying More to British Scientists'

SIR, Your leading article on the Migration Problem is most timely. It is obvious that as yet there has been no official recognition of the serious repercussions this emigration of scientists and technologists will undoubtedly have on the development of British industry in the years ahead.

This seems a problem that could be solved if, as you suggest, UK firms were to be less stinting in their remuneration to qualified chemists etc. There is obviously no call to raise the general level of salaries to that pertaining in America, where the cost of living is so much higher than it is here. But some of the present disparity should be removed and with it much of the incentive to migrate.

Such a move would not resolve this problem completely, for a certain number of scientists will always be attracted by unusual jobs on the other side of the world; it would, however, make those that stay at home feel that their intensive training and special knowledge were being adequately rewarded.

In this connection, it is interesting to record that many undergraduates make up their minds to emigrate on graduation almost as soon as they go up to University. This is made apparent from the recent survey conducted at Cambridge, results of which have been published in *Varsity*.

It appears that, from a sample survey of 6.5 per cent of men in their second and final years, that 11.3 per cent have decided to emigrate after graduating. Another 27.6 per cent are considering doing so. 34.1 per cent of women graduates voted for emigration and 14.9 per cent are considering taking this step.

Of all the prospective emigrants, 44.7 per cent are accounted for by those studying science. How much their attitude is governed by financial considerations is not made clear (some believe there will be a better outlet for new ideas in America and the Commonwealth). Certainly it seems that British industry must put its house in order if the rot is to be stopped.

Yours etc.,
C. M. FORRESTER.

London.

High Labour Turnover

Inability of many young men to stay for long in one job, was referred to by Mr. L. N. Sadler, managing director of Sadler and Co., chemical manufacturers, Middlesbrough, when he recently presented long service awards to employees. In support of this statement Mr. Sadler said that in 1956, his company had 238 new employees and that during the 12 months 233 others had left the firm's employ.

Bradford Symposium on Fibrous Linear Polymers

RECENT DEVELOPMENTS in the chemistry of fibrous linear polymers is the subject of a symposium to be held by the Bradford Chemical Society in conjunction with the Bradford Technical College (department of chemistry and dyeing) and the Yorkshire Council for Further Education. This will be held at the Technical College on 15 and 16 February and will be accompanied by exhibitions of chemical and physico-chemical apparatus and of fibres and fabrics.

First paper to be given at 7 p.m. on 15 February will be on Synthetic fibre forming polymers: some novel structures and properties, by Mr. Goodman of ICI Fibres Division. On 16 February papers will be given as follows: 10.30 a.m., Addition polymerisation: mechanisms and kinetics, by Professor F. S. Dainton; 2 p.m., Interaction of synthetic fibre forming polymers with liquids, by Dr. W. R. Moore; 3.45 p.m. Swelling and solution properties of natural fibres, by Dr. F. O. Howitt.

ICI Chief Warns of Increased Competition

WARNING of more severe competition in fertiliser markets was given on 24 January by Dr. S. W. Saunders, technical manager of the Billingham division of Imperial Chemical Industries. Oil companies were planning, he said, to go into ammonia and fertiliser production.

Dr. Saunders was speaking at a dinner given by the company to celebrate last year's record production of ammonia.

However, he forecast that after a difficult period in which increased supply would exceed demand, the steadily rising use of nitrogen fertilisers would bring about a situation where competition would not be so severe.

In the opinion of Dr. Saunders any Government of this country, whatever its politics, was almost certain to help agriculture as much as possible and that was a good thing for ammonia and fertilisers.

New Alkali Offices may have TV Link

PREPARATIONS are being made by the Alkali Division of ICI to erect new headquarters with accommodation for 700 staf, on the site of the old Winnington Lodge, near Northwich. Another important development is the building of a new wing to the division's research laboratory, estimated to cost £250,000. This will be the first major extension to the 28-year old building where polythene was discovered in 1933. Researches are continuing with natural rubber and rubber-like plastics.

The new offices which will take two years to erect and equip will be about half a mile from the main works. Hence a most modern system of communication is being planned, including a projected television link for the rapid transmission of cost documents, job slips and other items of primary administrative information.

Overseas News

PRODUCTION ESTIMATES FOR US CHEMICAL INDUSTRY

ESTIMATES of the future production of the US chemical industry are contained in *Baird-facts* published by the Baird Chemical Corp. By 1960 production of plastics should be 5,000 to 6,000 million lb. a year. Prices are expected to rise slightly this year—between 1 and 1.5 per cent overall.

Polythene is expected to increase from its present 600 million lb. a year to 1,300 million lb. by 1960. About 30 per cent of this will be low pressure type. A 20 per cent overlap between high and low pressure types is reported.

Price reductions for plasticisers are anticipated. Dioctyl phthalate (down $0.005) and tricresyl phthalate (down $0.02) have already decreased. These reductions indicate that the market is weakening.

Butadiene is expected to be in short supply by April but new production capacity will ease the demand later in the year.

Ammonia capacity will rise this year from 4.5 to 5.0 million tons as eight new companies and 18 new plants begin production. It is expected that the market will stay depressed till 1960.

Automation and New Plant at Chemische Werke Hüls

To finance further measures of automation in its chemical works, Chemische Werke Hüls AG., of Mart-Hüls have floated an industrial loan of DM 40 millions. Three automatic plants are already in operation: a sulphuric acid recovery plant; a plant for the production of acetylene oxide; and a unit manufacturing acryonitrile. It is understood that only a few directing staff are required at these three plants, which are controlled centrally.

The company is to set up also an experimental plant for the production of Vestolen—a low pressure polythene (see CHEMICAL AGE, 1956, **76**, 286), using the Ziegler process—which it has developed in conjunction with the coal mining company, Hibernia AG. It is understood that the plant will produce 50 tons of Vestolen a month.

Growth Substance from Bean Seedlings

STUDIES on an active growth promoting agent separated from etiolated bean seedlings are reported by Yo Isogai, in *Scientific Papers of the College of General Education, University of Tokyo* (1956, *vi*, 2, 167).

Water extract of etiolated bean seedlings was treated with strong cationic ion exchange resin and the adsorbed portion was eluted with sulphuric acid (0.2N and then with 2N). The 0.2N H_2SO_4 portion was neutralised, the Ba addition product was eliminated and the solution decolorised with carbon and concentrated. The fraction obtained was divided into soluble (AS-2) and insoluble parts with absolute alcohol. This latter part, thought to be constituted mainly of white amorphous and caramel-like yellow sticky substances was found to be markedly active in aqueous solution.

The alcohol insoluble fraction, however, contained an active aldehyde which is stated to have physiological activity even in very low concentration (1 ppm). Growth of the fungus *Aspergillus niger* was promoted.

German Heavy Water Plant

Chairman of Farbwerke Höchst, Herr Winnacker, stated this week that production of heavy water in Höchst's new plant, built at the low cost of £800,000, will start in the second half of this year. Initially six tons per year will be produced, but this capacity will be greatly expanded at a later date.

Investigating the Iodophors

Iodine Information, No 50, issued by the Chilean Iodine Educational Bureau, contains references to investigations with iodophors, proved iodine bacteriocides. The limitations of iodine have been overcome by recent US research which has resulted in so-called 'tamed' iodine compounds, more correctly termed iodophors. These are complexes of iodine with non-ionic surface active agents which carry iodine and release it when the iodophors come in contact with water. Twenty-five references are given.

Thailand to Expand Oil Refining Capacity

Permission has been given by the Government of Thailand for the construction at Bang-na of an oil refinery with a capacity of 5,000 barrels a day. It is to be constructed within 18 months by a Japanese concern at an estimated cost of US $17 million. It is intended that the refinery should run on imported crude oil.

Expansion of a second, smaller refinery, situated near Fang, near Chiengmai in Northern Thailand is also scheduled. At present, the refinery is operating on an experimental basis extracting asphalt, diesel oil and paraffin wax from some 50 barrels of crude oil. Cost of expansion is estimated of US $8 million. Equipment is being purchased in the US. Production is to be stepped up to 1,000 barrels a day local crude oil.

Both these refineries are to be operated by the Government run Oil Fuel Organisation.

Solar Distilled Water System in Australia

Experiments have been carried out in Victoria, Australia, by the Beaurepaire Tyre Service with an experimental solar furnace system. This consisted of a glass mirror collector mounted over a black plastics trough, in which the water was contained and from which the water was evaporated. Purified water vapour was collected automatically on a special condensation surface attached to the solar furnace and drained off into a series of adjacent collecting tanks.

It is claimed that eight gallons of distilled water a day were obtained, which was used in car batteries.

Texaco to Build 40,000 Barrels/Day Refinery

Construction for The Texas Co. of a new 40,000 barrel per day refinery will begin about 1 March, near Anacortes, Washington. Engineering work on the refinery has already begun and the plant is scheduled for completion by January 1959.

Texaco's newest refinery, to be known as Puget Sound Works, will be built on a site of approximately 760 acres, about three miles east of Anacortes, on the Olympic Peninsula.

The new refinery will manufacture automotive gasolines, jet fuel, diesel, furnace and heavy fuel oils and liquid petroleum gas for the rapidly expanding markets in the Northwest and West Coast areas.

Contracts for the general construction work have been awarded to the Bechtel Corp. of San Francisco and for the furnishing and erection of tankage to the Chicago Bridge and Iron Co.

The refinery will include a fluid catalytic cracking unit with a capacity of 18,000 barrels per calendar day, a catalytic reforming unit with a capacity of 7,000 barrels per day, a catalytic polymerisation unit, alkylation unit, and a hydrotreating unit, together with the necessary tankage, docks, utilities, and other miscellaneous facilities. The dock will be large enough to handle two tankers at the same time.

US Mines Bureau Surveys Mercury Deposits

A recent report by the US Department of the Interior, describes a Bureau of Mines investigation of 24 mercury deposits in western and central Nevada and one in Oregon. This was made in co-operation with the Department's Geological Survey to determine whether more extensive exploration work was warranted and to obtain information of

reserves of mercury ore. More than 4,200 ore samples were assayed during the survey. Mercury properties in Esmeralda, Mineral, Nye, Washoe, Pershing, Humboldt, Elko and Churchill Counties, New and Malheur County, Oreg, are detailed.

The report (report of investigations 5285) entitled Investigations of Mercury Deposits in Nevada and in Malheur County, Oreg, by W. T. Benson, can be obtained from the publications-distribution section, Bureau of Mines, 4800 Forbes Street, Pittsburgh 13, Pa.

New Paper on Peroxy Titanium Oxalate

Since Mazzucchelli and Pontanelli (*Atti Acad. Lincei*, 1908, **18** (1) 518) prepared a peroxy titanium oxalate compound of the formula Ti_2O_3 $(C_2O_4)_5$, the literature does not indicate any subsequent work on the peroxy titanium oxalate complexes. In a recent investigation (reported in *Proc. Ind. Acad. Sci.* 1956, xliv, No. 5, 287) D. P. Khankar and C. C. Patel of the Department of General Chemistry, Indian Institute of Science, Bangalore—3 describe the method of preparation of the normal peroxy titanium oxalate and its properties.

Dumping Duty on UK Acetone Exports

Government of South Africa has published in the official *Gazette* of 18 January Notice 76, which provides for the imposition of an ordinary dumping duty on acetone from the UK, when imported by or on behalf of the Union Government.

Spain's Fertiliser Output Up

In 1955, production of nitrogenous fertilisers amounted to 212,685 tons compared with 152,751 tons in 1954. National consumption during the 1954/55 season was about 670,000 tons, approximately two thirds of which was imported.

Du Pont to Build Orlon Plant

E. I. Du Pont de Nemours, which first produced the synthetic fibre Orlon commercially in 1952, plans to construct an orlon plant at Waynesboro, Va., US. The plant will have a rated capacity of 40m. lb. per year when completed in 1958. The amount of Orlon consumed by the textile industry in 1956 totalled 61 million lb.

Israeli Phosphate Exports may rise in 1957

It is estimated that about 100,000 tons of rock phosphate should be available for export from Israel this year. Output last year totalled 117,000 tons—of which under one-third was exported. However, production is expected to rise from 12,500 tons in February to over 20,000 tons a month by the end of this year and reach an annual total of 180,000 tons.

Since Israel's annual domestic consumption is of the order of 70,000 to 75,000 tons, an exportable surplus of over 100,000 tons should be available. According to reports at least half of this total has already been committed and negotiations are in hand for the remainder.

An output of 250,000 tons in 1958 is hoped for when additional excavating equipment has arrived from West Germany. It is understood that such an output will ensure that the Government-owned phosphate Mining Company makes a profit.

Instrument Exhibition and Congress in Dusseldorf

What is claimed to be West Germany's first large scale independent congress and exhibition of measuring instruments will be held in Dusseldorf from 2 to 10 November, 1957, under the title of Interkama. This exhibition, which will be international in nature, will be accompanied by a series of maintenance sessions on the subject of measuring and control instrumentation.

IG Farben to Compensate Former Jewish Workers

The Conference on Jewish Material Claims against Germany is to receive a sum of £3 million from the residual assets of IG Farben for distribution among Jews who worked under forced labour conditions for the organisation. Allied authorities had kept shares in Hüls chemical works in reverse until settlement of these claims was made. Payment was made on Wednesday this week and the way is now clear for distribution of Hüls shares to holders of IG Farben liquidation certificates.

Bayer Team discusses Dyestuffs Plant for India

Proposals for the setting up of a dyestuff intermediates plant have been submitted to the Government of India by a team of representatives from Bayer, Leverkusen, which is now in India. The project would include financial aid from the German organisation.

Rhodesian Nickel Discovery said to be 'Finest Strike'

A nickel deposit in a mountain, south of Bindura is described as 'the finest strike in the sterling area.' The mountain is 900 ft. high and said to be 'stiff with nickel.' From it, a reef 600 ft. wide extends for several miles. The discoverers, a Bindura prospector backed by a Salisbury business man, have a joint interest in the eight-mile long set of claims and have secured exclusive prospecting rights covering an area of 10 square miles.

Assays have been carried out by a Salisbury bank which describes the samples as 'the best ever to pass through their assay department.' The value was established at 3.78 per cent. The tonnage waiting to be mined is said to be 'fantastic'. Even if the whole of the mountain averaged only 1 per cent, the ore reserve above ground, i.e., in the mountain, is estimated at £100 million.

Oil from Alberta Tar Sands

Means for extracting oil from Alberta tar sands could be improved said the Canadian Minister for Mines, Mr. Prudham, recently. By these means big fuel resources would be made available to the world. His department had already designed, installed and operated a small low pressure hydrogenation plant which had successfully removed the very high sulphur content from the oil.

Supplies of Canadian Uranium Mill

Completion of one unit of the mill construction under way by Faraday Uranium Mines in Ontario's Bancroft area is expected by 31 March. There has been a delay in delivery of milling machinery.

Faraday Uranium Mines hold a $29.8 million contract from Eldorado Mining and Refining for the sale of uranium precipitates. The company is at present engaged in recalculating ore reserves there. Enough ore has been found and indicated to serve the mill for longer than the official sales contract, even at the planned rate of 750-tons daily milling rate and later at a probably increased rate of about 1,000 tons.

Price for the output of uranium is not known but it is reported that companies in this Bancroft area will get more than $10 a lb. for their production.

Sales of US Boron-Minerals in 1955

Sales of boron minerals increased 17 per cent to 924,496 short tons valued at $24,357,723, according to reports by producers to the Bureau of Mines, US Department of the Interior. This record exceeded the previous high of 862,797 short tons established in 1951.

Four firms reported production of boron compounds from natural sources. American Potash and Chemical Corp., recovered boron compounds from the brine of Searles Lake at Trona, Calif.; Pacific Coast Borax Co., mined kernite (hydrous sodium borate) from a bedded deposit in the Kramer district and colemanite (hydrous calcium borate) at Death Valley Junction; United States Borax Co., produced colemanite from a vein deposit near Shoshone, Calif.; West End Chemical Co. recovered boron compounds from the brine of Searles Lake.

Uranium Claims at Umtali, Rhodesia

It is learned that 28 blocks of claims have already been registered on the uranium deposits in the Zimunya Native Reserve in an area 15 miles south of Umtali, Rhodesia, and many additional claims are still being pegged. Some of the 10 individual peggers in the area have decided to pool their claims and form a company.

US Firm to Install India's Second DDT Plant

May Start Production by Mid-1958

EXECUTION of the project for setting up a second DDT factory at Alwaye (Kerala, South India), has been carried a stage further with the selection of a US company for supply, installation and commissioning of the plant. The factory, which is expected to cost about Rs. 80 lakhs, will have a capacity of 1,400 tons of DDT per year. It is expected to go into production by the middle of 1958.

Total value of the contract awarded to the US company—Singmaster and Breyer of New York—is $737,100 of which the rupee expenditure may be the equivalent of $150,000.

This Alwaye factory will be managed by the Hindustan Insecticides (Private) Ltd., a Government owned company under the Ministry of Production, which is entrusted with the management of the Delhi DDT factory. Work on the project has already begun.

With the completion of the Alwaye project, India will be self-sufficient in her requirements of anti-malaria insecticides which are at present estimated at 5,000 tons per annum. The capacity of the Delhi DDT factory is to be doubled. About 2,000 tons of insecticides other than DDT are being produced annually by private manufacturers.

Fertiliser-Heavy Water Project.—Vitro Engineering Division of New York has been appointed by the Government of India as technical consultant for the Rs. 22 crore Nangal fertiliser-cum-heavy water project. This is the only firm which has undertaken to set up a heavy water plant based on the catalytic exchange process. The other process—that of hydrogen distillation—is still considered to be in an experimental stage.

Ammonium Nitrate

The Nangal factory will manufacture annually 200,000 tons of ammonium nitrate to be suitably diluted to ensure maximum keeping qualities. It will also manufacture about 7.5 tons of heavy water per year by the catalytic exchange process. The factory is expected to be commissioned by March 1959.

Bochako, a firm of West German consultants, has been asked to submit a project report and prepare tender specifications for the fertiliser factory at Rourkela, at the site of the 1 million ton steel plant being set up by Krupp-Demag GmbH. The fertiliser factory will produce 80,000 tons of nitrogen most probably as nitro-limestone.

Paper and Pulp.—Permission has been given by the Government of India for 22 new paper mills to be set up. This, together with substantial expansion of existing 21 paper factories, would raise the country's present capacity for the production of paper and paper boards from 2.1 lakh tons to 5.4 lakh tons per year by the end of the second plan. Schemes for increasing the capacity further by 1.4 lakh tons are under consideration. The production of newsprint is also being stepped up. In addition to the Nepa Newsprint Factory in Madhya Pradesh, another newsprint factory is being established in the public sector by the National Industrial Development Corporation at Shakarnagar, near Hyderabad, with a capacity of 30,000 tons per annum. There is still scope for two more newsprint factories of 30,000 tons each in order to reach the country's requirements of 120,000 tons by the end of the Second Five-Year Plan.

INDIAN *NEWS*LETTER

The Government has approved the setting up of a plant in Assam to manufacture 30,000 tons of chemical pulp a year. Two proposals for the establishment of rayon grade pulp plants, with a total capacity of 50,000 tons per year, are under consideration. If both these projects materialise, the requirements of rayon grade pulp in the country for the next five years would be satisfactorily provided for.

Sugar Industry.—At a meeting held on 12 January the Development Council for Sugar Industry approved a production target of 2.16 million tons of sugar for 1957-58. Production during 1956-57 is estimated at 2.05 million tons.

According to this plan, 22 new factories and 17 existing factories with their expanded capacities will go into production during the year. This will raise the installed capacity of the industry by about 0.35 million tons. The additional production from the new capacity will be 0.25 million tons. With a view to increasing the sugar content of the standing crop, the Council approved a scheme for countrywide pre-harvest spraying with 2, 4-D (sodium salt).

Synthetic Rubber.—The team of US experts which toured the country last year to study the possibility of producing synthetic rubber, has now reported. A broad picture of the economics of the project for purposes of preliminary planning is given in the report.

It envisages the manufacture of 20,000 tons a year of synthetic rubber from butadiene and styrene. The total capital cost of the project is estimated at about Rs. 20 crores. Further technical details are being worked out.

Lignite.—Purchase of earth moving machinery and specialised mining equipment of the value of Rs. 5.5 crores has been sanctioned by the Government of India for the multi-purpose lignite project. The power wing of the Central Water and Power Commission has set up a planning cell at Madras for drawing up the plans and specifications for the thermal power station of 200,000 kW. Certain foreign firms have been asked to indicate the terms and conditions for technical assistance in setting up the fertiliser factory. A pilot briquetting and carbonising plant is being acquired under TCM aid plan. A company known as Neyveli Lignite Corporation Ltd. has been registered to take over the management of the project.

Exploration of Assam Oil.—The Government of India and the Assam Oil Company have reached agreement, subject to final ratification, regarding the formation of a company to carry out exploration and production of crude oil in the Nahorkatiya area in Assam. The Government would contribute 33½ per cent of the share capital of the new company and the rest would be contributed by the Assam Oil Company. Price of the crude oil produced would be fixed with Government approval. Oil needed for the proposed refinery to be set up in the eastern part of the country would be sold at a concessional rate.

Activated Earths.—Consumption of activated earths in India is estimated at about 5,000 tons a year and is likely to increase. About 2,000 tons are imported annually.

NCL Survey

Investigations were undertaken at the National Chemical Laboratory, Poona, to see how far clays found in different parts of the country could be used for making bleaching earths. The clays examined were powdered, sieved to pass 170 mesh and heated to about 300° C. On cooling, they were heated with hydrochloric acid or sulphuric acid, washed, dried, and finally heated to 300°C. Fifteen earths have so far been treated of which six gave satisfactory results.

Bromine from Sea Water.—Tata Chemicals Ltd., Mithapur, is manufacturing sodium, potassium and ammonium bromides from liquid bromine extracted from sea water. This is the only plant in India employing sea water for the production of these salts for the pharmaceutical industry.

After recovery of common salt, the bitterns (35° Be) from saltworks are further concentrated in open pans (*kyars*) by solar evaporation. The average bromine content at this stage is 0.35 per cent. Recovery is effected by the Kubierschky method.

At present the entire Indian requirements of potassium, sodium and ammonium bromides are met by the existing unit which has a capacity of 20,000-25,000 lb. of bromine per month. To meet the increasing demand for bromine and ethylene dibromide, the production of bromine is being stepped up and a second Kubierschky tower is expected to go into production in March 1957. Provision has also been made to double the output of potassium, sodium and ammonium bromides.

Substitute for Selenium.—The high cost

[Continued on page 258

DEVELOPMENTS IN ORGANOTIN COMPOUNDS REPORTED BY DR. HEDGES

DEVELOPMENTS in organotin compounds are reported in the spring 1957 issue of the quarterly journal of the Tin Research Institute. It would appear that there are many interesting possibilities for organotin compounds. In agriculture, for instance, thousands of tons of organotin compounds could be used as fungicides, insecticides and weedkillers, reports Dr. E. S. Hedges, Director of the Tin Research Institute.

Trials of organotin compounds are already being conducted for moth-proofing wool and for preserving wood against fungi, termites, furniture beetles etc. These compounds have been shown to prevent shines in paper-making and moulds in polyvinyl acetate emulsion paints.

Apart from the potential uses mentioned above organotin compounds are now being used in the plastics industry as stabilisers for p.v.c. and chlorinated rubber paints, for preventing decomposition of synthetic chlorinated insulating oils, and for treatment of worms and larvæ in poultry and cattle.

The preservative action of organotin compounds upon manilla and sisal ropes immersed in sea water was recently tested by the Institute.

Comparisons were made between untreated ropes, ropes treated with two different commercial preservatives and ropes impregnated with solutions of two organotin compounds. The two compounds tested were triethyltin hydroxide and tributyltin acetate. The results show that the only samples to be unbroken by a pull with the hands at any stage were the sisal ropes impregnated with triethyltin hydroxide. None of the 10 ropes impregnated with organotin compounds broke before the ropes had dried, but 13 of the 16 other ropes were broken in withdrawal and two of the remaining three broke when first tested in the laboratory.

Also included in this spring issue of *Tin and its Uses* is a practical tinner's account of the technique he uses to overcome the de-welting tendency sometimes occurring in the tinning of steel wares. He records that pickling in nitric acid brings about a great improvement in quality of the tin coating. When correctly carried out the tin coatings are brilliant and free from all traces of de-welting and the reduction of defects goes a long way to compensate for the extra expense of this method.

Chemical Society Anniversary Meetings

THE ANNIVERSARY meetings of the Chemical Society will be held in Cambridge on 9 to 12 April. Applications should be made as soon as possible, and in any case not later than 11 March.

Three symposia will be held during the meetings. They will be:

Organic Phosphoric esters and related compounds.

Physical Reactions of free radicals in the gas phase.

Inorganic Recent aspects of the inorganic chemistry of nitrogen.

A number of visits have been arranged to companies of interest in and around Cambridge, including: Aero Research Ltd., W. G. Pye and Co. and Unicam Ltd., Fisons Pest Control Ltd., Cambridge Instrument Co. Ltd., Kayser Bondor Ltd., Chivers and Sons Ltd., and Tube Investments Ltd. Research Laboratories.

Registration fee, which covers abstracts of papers, participation in visits or social events, or stay in the colleges, is 10s for fellows. Non-fellows may also register on payment of £2 2s.

Application forms are obtainable from The Chemical Society, Burlington House, Piccadilly, London W1.

Shell Moulding at Slough

Shell moulding plant of Langley Alloys Ltd., Slough, has been expanded and the company is increasing production by the most modern methods. Large quantities of shell moulded castings in a range of corrosion resistant, high temperature and high conductivity alloys are now being produced.

New Uses in Industry for Nylon

NYLON'S ever-increasing importance to industry will be underlined by British Nylon Spinners Ltd. in their display at the Industrial Textiles Exhibition at the Royal Albert Haall, 1 to 5 April.

During the past two years the use of nylon in industrial fabrics, nets and ropes has almost doubled. Important developments during the past 12 months have included the launching of nylon-corded tyres for lorries and the introduction of coated nylon fabrics. More recently there has been considerable interest by manufacturers of industrial fabrics in the new bulked nylon yarns such as Ban-Lon, Agilon and Taslan. Papermakers' felts incorporating Ban-Lon nylon, ideal because of its high moisture uptake, have already undergone successful trials. Further interesting developments can be expected shortly.

Buffet Dance for Charity

A buffet dance organised by the London sections, Royal Institute of Chemistry and Society of Chemical Industry will be held at Caxton Hall, London SW1 on 28 February in aid of the RIC benevolent fund and the London Section SCI hospitality fund. Dancing will be from 7.30 pm to 11.45 pm. Tickets price 12s. 6d. each can be obtained from Mr. W. M. Lewis, 30 Russell Square, WC1 or the SCI assistant secretry, 14 Belgrave Square, SW1.

Pattern of Chemical Exports

PATTERN of chemical capacity from the UK to the sterling area, non-sterling area and to the world are given in the current issue of the Board of Trade Journal. Figures of chemical exports from the US and Canada and from OEEC countries to the UK and the rest of the sterling bloc are also given.

UK EXPORTS OF CHEMICALS

	Quarterly Average £ million
To sterling area—	
1952	23.3
1953	22.2
1954	25.7
1955	29.5
1955—1st Quarter	29.3
2nd Quarter	25.3
3rd Quarter	32.1
4th Quarter	31.2
1956—1st Quarter	29.5
2nd Quarter	30.4
3rd Quarter	28.1
To Non-sterling world—	
1952	22.8
1953	22.2
1954	25.3
1955	28.8
1955—1st Quarter	30.0
2nd Quarter	26.4
3rd Quarter	29.2
4th Quarter	29.6
1956—1st Quarter	30.6
2nd Quarter	31.3
3rd Quarter	29.8
To World total—	
1952	46.1
1953	44.4
1954	51.0
1955	58.3
1955—1st Quarter	59.2
2nd Quarter	51.7
3rd Quarter	61.4
4th Quarter	60.8
1956—1st Quarter	60.1
2nd Quarter	61.8
3rd Quarter	57.9

CHEMICAL EXPORTS OF NORTH AMERICA AND OEEC COUNTRIES TO STERLING AREA

	From US & Canada	*From OEEC Countries*
	Quarterly averages in US $ million	
To United Kingdom—		
1951	16	38
1952	11	25
1953	11	28
1954	19	34
1955	21	36
1954—3rd Quarter	17	31
4th Quarter	22	34
2nd Quarter	23	34
1955—1st Quarter	20	36
3rd Quarter	20	33
4th Quarter	20	42
1956—1st Quarter	18	40
2nd Quarter	21	39
To Rest of sterling area—		
1951	20	36
1952	18	30
1953	15	32
1954	19	42
1955	21	46
1954—3rd Quarter	22	45
4th Quarter	23	44
1955—1st Quarter	21	45
2nd Quarter	21	43
3rd Quarter	19	47
4th Quarter	21	52
1956—1st Quarter	23	50
2nd Quarter	22	48
To Sterling area—		
1951	36	74
1952	29	55
1953	26	60
1954	38	76
1955	41	83
1954—3rd Quarter	39	75
4th Quarter	45	78
1955—1st Quarter	41	81
2nd Quarter	44	76
3rd Quarter	39	79
4th Quarter	41	94
1956—1st Quarter	41	90
2nd Quarter	43	87

ANTI-DUMPING BILL STILL LEFT WITHOUT TEETH

Problem of Short Term Dumping

By Our Parliamentary Correspondent

ONE of the main complaints that the chemical industry has levelled against the Customs Duties (Dumping and Subsidies) Bill has been that it has had no teeth. This Bill was considered in committee stage last week, but none of the amendments sponsored by the Board of Trade or those that proved acceptable to the Government will do much to meet this complaint.

In the debate it was clear that both sides of the House regard a Bill of this nature as being a necessary forerunner to any UK participation in the projected European Common Market. A number of Members on both benches, however, were strongly critical of the Bill as it now stands. It may be that some of these objections will be ironed out in the Government approach to the free trade proposals.

On the day following the discussion of the Bill, Sir David Eccles, president of the Board of Trade, was called on to answer a written question asking if, before joining a common market, the UK Government would insist on no participation in such a market if it gave any special advantages to exporting firms such as export subsidies, or tax concessions, unless equal advantages were given by general agreement by all the other Governments in the common market to their own exporting firms.

Government's Aim

Sir David would not go beyond saying that it would be the aim of the Government to secure that all member countries should agree not to grant export subsidies or other artificial aids designed to give an unfair advantage to their exporters.

It is clear from the discussion on the committee stage that Members recognise the importance of effective measures to combat dual-pricing and that it would not be easy to provide evidence of this double-pricing. In fact, it might well take months before satisfactory evidence could be produced. But the Customs Duties (Dumping and Subsidies) Bill as now amended would give no protection in many of the cases of dumping that have been the subject of complaint by British chemical manufacturers.

The main threat—and it should be stated from its record the British chemical industry has no fear of normal competition—comes from certain large Continental producers who have dumped one article for a short time, switching quickly to another material within a month or two. It was made clear during the committee stage, that the Government does not envisage using the Bill to prevent that form of dumping. It was felt that before an order could be made a full investigation of the complaint, would have to take place and that the firm against whom the complaint was made should have the opportunity of explaining its action.

(In recent months the main 'cheap' chemical imports have been those of synthetic organic chemicals, principally in the pharmaceutical field. PAS sodium from Italy is a case in point; in fact low price competition has been such that production in this country has ceased. US producers suffering from similar imports have recently renewed their complaints on this score to the Tariff Board. Competition has also been keen in alkaloids and associated products such as caffein etc. There have in recent weeks been rumours of a threatened flooding of the UK market with sodium bisulphite from Sweden; so far nothing has materialised).

Retrospective Legislation

In the House of Commons debate, more than one member wanted the Minister to introduce retrospective legislation, which would provide the answer in the case of short-term dumping. But Sir David did not like the principle involved and in this he had fairly wide support. He also made the point that administrative difficulties would prove insuperable.

It is somewhat surprising that no-one proposed that the Government should establish a number of committees with the power of imposing a temporary countervailing duty. Such action could be taken once a complaint had been lodged and the committee was agreed that a *primae facie* case had been made out. A full enquiry could follow and if it established that such action was justified, then a permanent order could be issued; if the case was not established, then the temporary order could easily be revoked.

Provision along these lines would appear vital, if the Bill is not to remain the milk and water affair that it now is. It is particularly important if the proposed European common market is to come about. There are, however, now many doubts in Whitehall as to the fate of this project, particularly since the French attitude has become more intransigent. Among the other original Messina countries that seek to establish a customs union, West Germany and the Netherlands have cooled perceptibly following French insistence that France's participation should be conditional on the provision of assistance in connection with her North African territories.

These objections might be overcome by further negotiation, but many members of Parliament have for long felt that France would prove the main stumbling block to freer trade in Europe; they now feel that time is proving them right and it seems likely that France's attitude will continue to harden.

It is interesting to note that in their report to the Council of the Organisation for European Economic Co-operation, published on Tuesday this week, the special OEEC working party—which included UK representatives—agreed that the creation of a free trade area was technically possible. It now seems probable that the OEEC Ministers, when they meet in Paris on 12 February, will not only endorse this opinion but will also say that it is desirable that such an area should be created and that they will give the necessary instructions to enable negotiations for the drafting of an agreement to be started and conducted with dispatch and efficiency.

A Government White Paper on the common market proposals was due to be published on Thursday.

Whatever the fate of the proposed common market there is no doubt that efforts to put teeth into anti-dumping Bill will be continued until it reaches the Statute Book.

BoT President Awaits BOC Comments on Monopolies Report

SIR DAVID ECCLES, President of the Board of Trade, wishes to give the interests concerned in the Monopolies Commission report on the supply of certain industrial and medical gases, a chance to comment on the report before deciding what action to take. He made this clear in a reply to a Parliamentary question last week.

Sir David was asked in a supplementary question to pay particular attention to the statement in the report that existing legislation did not seem to provide any effective means of dealing with the situation. He said that this was one of the parts of the Report which he had in mind.

Crude Oil Imports

UK imports of crude oil from Persia in 1956 totalled 822 million gallons said Mr. David Renton, Parliamentary Secretary to the Minister of Power on Monday this week. Refined product imports from Persia amounted to 52 million gallons, comprising: motor spirit 33 m; gas/diesel 9 m; kerosene 5 m; fuel oil 5 m. Replying to another question he said there had been no crude oil imports from Saudi Arabia since November last.

Research Co-ordination

Dr. Barnett Stross (Lab, Stoke Central) on 31 January doubted the efficiency of the existing machinery that co-ordinates Britain's technological research. He asked the Prime Minister if he had noted the criticism in scientific circles suggesting

there was some doubt about it. 'Is it,' he added, 'in the Prime Minister's mind that he may want to do something about this to see if it can be improved?'

It is not clear what prompted the question as Dr. Stross was not too specific in his charges. Mr. Harold Macmillan in his reply said: 'I think the work done reveals that admirable strides have been made in recent years. At all times, we keep the matter under review and if any improvement can be made, or if Dr. Stross can make any suggestion, I shall be happy to discuss it with him.'

Mr. Macmillan told the House that an immense complex of research, undertaken by Government Departments and Government-aided research organisations, was co-ordinated through the interaction of the councils, advisory committees and research boards which controlled or advised on research programmes and by extensive contacts between scientists and technologists working on related projects.

Atomic Energy Policy

Ministerial responsibility for the Atomic Energy Programme was the subject of another question on the same day that was directed to Mr. Macmillan by Mr. Douglas Jay (Lab., North Battersea). The Prime Minister said that Sir Percy Mills, Minister of Power, would be responsible for the nuclear power programme, but that the Atomic Energy Authority would remain the responsibility of the Marquess of Salisbury.

Mr. Jay declared that the Ministry of Power was little more than the Ministry of Fuel and Power without the 'Fuel'. In his rejoinder, Mr. Macmillan said the Minister's official responsibility included a general oversight of the iron and steel trade. Research carried out by the Atomic Energy Authority was under the Marquess of Salisbury. Sir Percy would be responsible for practical development and implementation.

In the civilian field, Government scientific policy came generally within the responsibilities of the Lord President of the Council, who was advised by the Advisory Council on Scientific Policy. The Minister of Defence had similar responsibilities in the defence field.

Radiation Code

Because of the need to take into account recent recommendations of the International Commission on Radiological Protection, there had been a delay in the drafting of the proposed Code of Ionising Radiations Regulations. This was stated by Mr. Ian Macleod, Minister of Labour, in reply to a written Parliamentary question last week.

FOR YOUR DIARY

MONDAY 11 FEBRUARY

CS—Cambridge: University Chemical Laboratory, Lensfield Road, 8.30 p.m. 'Reaction Kinetics in Acidic Media' by Dr. V. Gold.

SCI (Yorkshire Section)—Leeds: Chemistry Lecture Theatre, University, 7 p.m. 'Organo-phosphorus Insecticides' by Dr. B. A. Kilby.

TUESDAY 12 FEBRUARY

SAC—Birmingham: Mason Theatre University, Edmund Street, 7 p.m. 'High Frequency Titrations': 'Instrumentation' by J. Allen, 'Applications' by Dr. E. S. Lane.

SCI (Chemical Engineering Group)—London: 14 Belgrave Square SW1, 5.30 p.m. 'Some Aspects of British Standards in Relation to Chemical Engineering in the Chemical Industry' by D. E. B. Greensmith.

WEDNESDAY 13 FEBRUARY

RIC—London: Royal Institution, 21 Albemarle Street W1, 6.30 p.m. 'Chemical Fibres and the Community' by Dr. B. P. Ridge.

SCI (Food Group)—London: 14 Belgrave Square SW1, 6.45 p.m.

Royal Society of Arts—London: John Adam Street, Adelphi WC2, 2.30 p.m. 'Development and Use of Glass Fibres' by A. Hudson Davies.

Inst. of Metal Finishing (Scottish Branch)—Glasgow: Burlington House, Bath Street, 7.30 p.m. Annual dance.

Manchester Metallurgical Society—Manchester: Manchester Room, Central Library, 6.30 p.m. 'Titanium' by Dr. J. W. Rodgers.

THURSDAY 14 FEBRUARY

CS—London: Lecture Theatre, Royal Institution, Albermarle Street W1, 7.30 p.m. Pedler Lecture: 'Course of Polar Reactions in Non-Polar Conditions' by Professor C. K. Ingold.

CS—Bristol: Chemistry Department, The University, 7 p.m. 'Free-radical Chemistry—A Survey' by Prof. D. H. Hey.

CS—Liverpool: Chemistry Lecture Theatre, University, 5 p.m. 'Metal Derivatives of Cyclopentadiene' by Professor G. Wilkinson.

FRIDAY 15 FEBRUARY

RIC—West Norwood: Norwood Technical College, Knight's Hill, 6.30 p.m. Film display.

CS—Cambridge: University Chemical Laboratory, Pembroke Street, 8.30 p.m. 'Some Recent Developments in the Chemistry of Metallic Surfaces' by Professor K. W. Sykes.

CS—Manchester: Chemistry Lecture Theatre, University, 6.30 p.m. 'Biosynthesis of Cholesterol' by Dr. J. W. Cornforth.

CS—St. Andrews: Chemistry Department, St. Salvator's College, 5.15 p.m. 'Reduction by Metal-Ammonia Systems' by Professor A. J. Birch.

Hull Chemical and Engineering Society—Hull: Organic Lecture Theatre, University, 7.30 p.m. 'Radioactive Techniques in Industry and Research' by Dr. G. B. Cook.

Bradford Chemical Society—Bradford: Technical College, 7 p.m. Symposium on 'Recent Developments in the Chemistry of Fibrous Linear Polymers'; exhibitions of chemical and physico-chemical apparatus and of fibres and fabrics.

INDIAN *NEWS* LETTER

(*Continued from page 255*)

and world shortage of selenium used as a colorant in the production of red glass have seriously affected the production, prices and quality of red bangles produced in the country. The glass bangles industry has an annual capacity of 35,000 tons and uses about 5 tons of selenium.

Investigations undertaken on substitutes for selenium at the Central Glass and Ceramic Research Institute, Calcutta, have resulted in the development of a process (*Ind. Pats.* 51847 & 55453) making use of copper as a colorant. The process does not involve any material change in the technique of manufacturing employed at present. After the bangles are made by the usual process, red copper colour is developed by heat-treatment in a muffle furnace. The temperature and time required for the treatment are about the same as employed for firing liquid gold-decorated bangles.

Trials conducted over a period of two years using compositions developed at the Institute have given excellent results. The copper red bangles produced have a striking resemblance to those made from selenium.

Tariff Protection for INH.—The Government of India's resolution on the Tariff Commission's report on the grant of protection and/or assistance to the isonicotinic acid hydrazide (isoniazid), INH, industry has been published.

Import Duties

While the Government has accepted the Tariff Commission's recommendation that the industry need not be protected by higher tariff, they feel it deserves to be assisted in reducing its cost of production. For this purpose the Government has decided that the import duty on *gamma* picoline which is an essential raw material for this industry, should be remitted in full in the case of imports of this item from preferential sources and reduced to 10 per cent *ad valorem* for imports from non-preferential sources.

Weights and Measures.—The Standards of Weights and Measures Bill is to be introduced in India on 1 April 1958. A national sample survey is being organised by the Standing Metric Committee to estimate the requirements of weights and measures on the metric system.

New Companies.—During the first five months of the current financial year, 321 new companies with a total authorised capital of Rs. 6,405 lakhs, have been formed as against 578 companies with an authorised capital of Rs. 5,230 lakhs during the corresponding period of the preceding year.

Among new registrations for the period April-August 1956: were Agricultural and Allied Activities, 11 companies, authorised capital Rr. 331 lakhs; Mining and Quarrying, seven companies, authorised capital Rs. 208 lakhs; Processing and Manufacture (foodstuffs, etc.), 26 companies authorised capital Rs. 1,781 lakhs; Processing and Manufacture (metals and chemicals), 58 companies, authorised capital Rs.. 483 lakhs.

Chemist's Bookshelf

SOURCES OF INFORMATION

RECORDS AND RESEARCH IN ENGINEERING AND INDUSTRIAL SCIENCE. 3rd edition. By *J. E. Holmstrom*. Chapman and Hall, London. 1956. Pp. xii+491. 60s.

The enormous development of technical and scientific research in this century has led to the parallel growth of publications, abstracts, libraries and institutions existing to carry out research and to make the results available. It is important that all engaged in technical or scientific work should both be aware of such sources of information and able to use them effectively. This book is intended to serve as a guide to these resources and to promote their efficient use and improvement. The second edition has been extended and almost entirely rewritten and rearranged.

The first three chapters serve as a background to the rest of the book. Fundamental and applied science are distinguished and their direction, planning and control outlined. The functions of experiment and observation, hypothesis, theory, chance and intuition in research are considered. Stages of development of technology from science are illustrated diagrammatically and by examples. A long chapter on the substance of technical science has the object of orienting and encouraging the reader to widen his outlook and scientific reading. The reader is assumed to be either a specialist technologist or a specialist in a collateral field, such as a librarian or administrator. The sciences are classified and sketches of some points of topical interest and importance in a number of them are given. Treatment here is uneven. The author seems at home with mathematics, physics, electronics and radioactivity but is perhaps less happy with others, especially physical chemistry. Specifically, the method of measurment of *p*H outlined on p. 111 is wrong and the reader might imagine the main application of *p*H to be agricultural.

Scientific Organisations

Three chapters are concerned with scientific organisations, the first dealing with those in Britain. General and specific aims and functions of different technical and scientific societies are considered. Here it should be noted that the Faraday Society is concerned with physical chemistry generally and not, as suggested on p. 165, with electrochemistry only.

Research and training in Universities are briefly considered and training outside the Universities discussed. The provision of engineering and other graduates by the major technical colleges via London University external degrees and the recent development of 'sandwich' courses in technology are not, however, mentioned. Government scientific organisations and their functions are discussed. There is a useful list of research associations giving the address and a summary of the interests of each. Independent industrial research and the British Standards Institution are briefly discussed.

Concise accounts of organisations in the Commonwealth, Japan, Germany, France, Switzerland, Sweden, the US and the USSR form another chapter. This might well be extended to include other European countries and such internationally known institutions as the Weizmann Institute. Another chapter deals with specialised agencies of the United Nations, International Scientific Unions, the World Power Conference, the purpose and nature of technical assistance and its application in the Commonwealth and by the US and the United Nations.

The remainder of the book is concerned with records. A chapter on those conveying information includes very useful discussions of note taking and exposition. Internal diffusion, patents, reports, articles and reviews are discussed in some detail. A further chapter deals with references and provides much useful information for those engaged in literature searches. Bibliographical aids, citations, abstracts and their sources, book reviews and the arrangements and procedures for abstracting receive detailed consideration. The final chapter deals with the obtaining of books, journals and other records, the circulation and disposition of these within an organisation and their use in retrospective literature searches. There is an account of libraries and external information services in this and other countries. Concise accounts are given of internal information services, the functions of information officers and librarians, methods of indexing, classification and automatic selection.

There is an extensive bibliography containing 496 references. Not the least interesting feature is the method of indexing. For a book of this type, the price is reasonable. It may be read with profit by all engaged in scientific or technical work. The amount of practical information it contains makes it particularly valuable to information officers and librarians and to those engaged in searches of scientific and technical literature.

W. R. MOORE.

A Tribute to Sir Robert Robinson

PERSPECTIVES IN ORGANIC CHEMISTRY. Edited by *Sir Alexander Todd*. Interscience Publishers Ltd., New York and London. 1956. Pp. 527. 55s.

At the time of the retirement of Sir Robert Robinson from the academic scene he has dominated for so long, it is a happy gesture to publish, under the editorship of Sir Alexander Todd, a series of essays by distinguished colleagues and collaborators. Unlike many gestures, however, the result is both fruitful and thought provoking. The titles and authors of these reviews speak for themselves: The Nature of the Theory of Resonance (Linus Pauling), Reaction Mechanisms (P. D. Bartlett), The Development of the Concept of Aromaticity (Wilson Baker), Stereochemistry (D. H. R. Barton), Die Bedeutung der vielgliedrigen Ringverbindungen für die theoretische organische Chemie (V. Prelog), Biosynthetic Theories in Organic Chemistry (A. J. Birch), Synthesis (R. B. Woodward), Neue Entwicklungen der metallorganischen Synthese (Karl Ziegler), Carbohydrates (E. L. Hirst), Nucleic Acids (Sir Alexander Todd), Bedeutung der theoretischen organischen Chemie für die Chemie der Terpenverbindungen (L. Ruzicka), Steroids (C. W. Shoppee), Alkaloids (E. Schlittler), Isotopes in Organic Chemistry (J. W. Cornforth), Micro-organisms in Organic Chemistry (Karl Folkers), Chemotherapy (James Walker), Organic Chemistry and Conifer Taxonomy (Holger Erdtman), Organische Chemie und Genetik (A. Butenandt).

The articles are not purely reviews but the occasion has been used to present in a thinking-out-loud style the author's ponderings on the subject. The result is a welcome change from the more familiar arid austerities of organic chemical prose. Amidst this plethora of distinction it is obviously invidious to pick out any individual item, but the characteristic contribution of Professor Woodward possessed especial appeal for me. His shrewd review of the present position of synthetic organic chemistry is a most enjoyable exposition. The presentation and lay-out of the book is worthy of its contents and the volume is a pleasure to handle. K. RAPHAEL.

For Non-Specialists

INTRODUCTORY ORGANIC CHEMISTRY. 3rd edition. By *E. Wertheim* and *Harold Jeskey*. McGraw-Hill Book Co., New York. 1956. Pp. 476. 41s. 6d.

This work first appeared in 1942, and the second edition in 1948. It is designed to give students of subjects such as agriculture, veterinary science, nutrition, medicine, dentistry and pharmacy a working knowledge of organic chemistry and biochemistry. The new edition brings the work up-to-date by including some of the latest developments in organic chemistry.

There can be no doubt that the work achieves what it aims to do admirably. It has been the reviewer's experience that medical and dental students find organic chemistry a rather trying subject—one to be abandoned as soon as the curriculum permits. This book will help them to feel differently. The authors are to be congratulated on their interesting and readable presentation. Copious diagrams

and photographs make the material particularly palatable to the non-specialist in the subject. The chapters on biochemistry, including amino-acids, proteins, enzymes, hormones, digestion of foods, metabolism, nutrition and dietary necessities are particularly well done, and these, of course, are the topics which will be most interesting to the student for whom the book is intended.

No errors of any importance have been found, but one or two comments may be made. Mustard gas is now made by other important methods, in addition to the method outlined on p. 104. It is not quite correct to say (p. 256) that vitamin D contains a phenanthrene nucleus, and the alkaloid colchicine (p. 337) is also not derived from phenanthrene. Finally, it is doubtful whether, as is stated on p. 364, vitamin A was synthesised in 1937. The authors are presumably here referring to the Kuhn-Morris synthesis, which resulted in a heterogeneous product showing vitamin A activity. The total synthesis of the pure vitamin was not achieved until 1947.

There is a useful glossary of chemical, biological and medical terms, a list of reference books and a comprehensive index. At the end of each chapter is a list of questions, some of which seem to be of too elementary a character.

The reproduction is excellent, and the price very reasonable. A. R. PINDER.

An Expensive Survey

CONTEMPORARY PHYSICS. By *C. F. Von Weizsacker* and *J. Juilfs*. Hutchinson and Co. Ltd., London. 1956. Pp. 150. 18s.

This book is a rather expensive survey of a certain amount of modern physics—a series of essays containing some parts which are rather superficial and not quite accurate or up to date. There are a few surprising omissions, for example, thermo-nuclear reactions are entirely omitted, and the overall impression is that almost any competent physicist could have written several of the sections—and that they were probably written a few years ago.

A few faults which come to mind are: Table 2 uses the term electric waves whereas many readers would more clearly understand the term radio waves which is normally used; fig. 24 mentions nutrettos which are not mentioned anywhere in the text; table 5 omits elements 99, 100, 101, and table 3 omits mention of the negative proton and anti-neutron.

The use of the term 'light quanta' on p. 128 is inaccurate even at the popular level. Page 123 says there are two isotopes of uranium—at least twice as many are well known. It might be helpful if the index indicated topics as well as merely names.

The general impression is of a book some parts of which have been dashed off in quite a hurry with no attempt at revision or bringing it up to date. The book probably fulfills part of its purpose—as a review for the educated layman or sixth form student—and it is agreeably free from mathematics. There are nine photos and 30 drawings, some of those connected with electromagnetic fields being quite good. H.M.

A COMPREHENSIVE TREATISE

ORGANIC CHEMISTRY. By *L. F.* and *M. Fieser*. 3rd edition. Reinhold Publishing Corporation, New York; Chapman and Hall Ltd., London. 1956. Pp. 1,112. 50s.

The original edition of this well-known treatise on organic chemistry first appeared in 1944 and was followed some six years later by the second edition. In the period that has elapsed since then there have been many important new developments among a wide variety of organic compounds. The application of isotopic tracers and of microbiological techniques has accelerated progress in the study of the metabolism of fats, carbohydrates and proteins, and it has accordingly been necessary to revise completely the chapters devoted to these subjects.

On the theoretical side advances have been no less marked, and in the chapter devoted to the formation and stability of ring compounds the concepts of conformational analysis are described and later used in a consideration of the chemistry of sugars, terpenes, alkaloids and steroids. The molecular orbital theory, of importance to a proper understanding of organic phenomena, is introduced early in the book, and the mechanism of ionic and free radical reactions is included in greater detail than previously. Some other new subjects dealt with are the structures of reserpine and vitamin B_{12} and the complete synthesis of aldosterone.

An interesting development, which might well be considered by other American authors, is the deletion of non-essential details of technological processes, production figures and trade names, as they reflect mainly American practice. This new outlook, based upon an appreciation of the wide appeal of Fiesers' *Organic Chemistry* outside the US, means that space is saved for more vital topics. Problems are included at the end of the various chapters and answers to them at the end of the book. Brief biographical sketches of past and present chemists associated with developments cited in the text are given as footnotes at the bottom of the relevant page. Since the list now totals 454 entries, the question might be considered whether they would not be more useful collected together at the end of the book.

It is not possible to summarise here the 40 chapters, which make up this extensive treatise. They range widely in topic from alcohols and proteins to dyes and vitamins. The book is well produced and the printing is excellent. The present price compares more than favourably with that of other books on organic chemistry and related branches of science, and should be well within the reach of the majority of chemical students, to whom the book can be strongly recommended. G.S.E.

Organic Theory

PHYSICAL ORGANIC CHEMISTRY. By *J. Hine*. McGraw-Hill Publishing Co. Ltd., London. 1956. Pp. 497. 67s. 6d.

The mushroom growth of physical organic chemistry has certainly eased the lot of the practical organic chemist by providing a theoretical rationale of his practical findings. The practical man, however, while only too willing to spread a veneer of theoretical respectability over his work, frequently finds it difficult to keep up with clashing theoretical ideas especially at the growing points of the subject. To those in such a quandary this book is most helpful. Its exposition is clear, precise and, best of all, even-handed in its treatment of alternative views. The attractive presentation and ease of consultation enhance its value as a book to be recommended. K. RAPHAEL.

Modern Techniques in Latest Edition

EXPERIMENTAL PHYSICAL CHEMISTRY. 5th Edition. By *Daniels, Mathews, Williams, Bender, Alberty*. McGraw-Hill, London. 1956. Pp. xi + 482. 49s.

For 30 years 'Daniels, Mathews and Williams' has been held in the highest regard in laboratories where practical physical chemistry is taught. No textbook inculcates better the principles of physical chemistry and the discipline of careful experimentation. Furthermore, each new edition has succeeded admirably in keeping pace with advances in the subject, and this latest edition is no exception. Experiments in such developing fields as chromatographic absorption, differential thermal analysis, high vacuum technique and electronics have been incorporated, and all the previously used experiments have been reviewed and revised where necessary.

The book, as usual, is divided into two parts. Part I deals with the theory and method of 59 individual experiments in the fields of gases, liquids, solutions, homogeneous and heterogeneous equilibria, kinetics, thermochemistry, conductance, electrode and electromotive force phenomena, dielectrics, colloids, optical methods, photochemistry, radiochemistry, high vacuum technique and electronics. In each instance the applications of the experiment are indicated clearly and suggestions for further work outlined.

Part II is mainly concerned with apparatus and techniques required for more advanced work. It includes elementary accounts of the principles and uses of such instruments as—infra-red and ultra-violet spectrophotometers; the ultramicroscope; gas, bimetallic and resistance thermometers; thermocouples and pyrometers; a.c. bridges; valves, relays, photoelectric cells and rectifiers; cathode ray oscilloscope; pulse, Geiger-Muller, crystal and neutron counters; the mass spectrometer. There is also a good practical account of the treatment and estimation of experimental errors and the presentation of data.

No laboratory where physical chemistry is taught can afford to be without this book. The production is excellent and the cost reasonable.

H. MACKLE

People in the NEWS

● The 13th annual general meeting of the microchemistry group of the Society for Analytical Chemistry was held on 25 January. The following officers were elected: *Chairman*, D. F. PHILLIPS; *vice-chairman*, F. HOLMES, University College of North Wales; *honorary secretary*, D. W. WILSON, Sir John Cass College, Jewry Street, Aldgate, London EC3; *honorary treasurer*, G. INGRAM, Courtaulds Ltd.

● At the 22nd annual general meeting of the Scottish section of the Society for Analytical Chemistry on 17 January the following officers were elected: *Chairman*: DR. MAGNUS PYKE; *vice-chairman*, A. N. HARROW. Bilselang Bros., Glasgow; *honorary secretary* and *treasurer*, J. A. EGGLESTON, Boots Pure Drug Co. Ltd., Airdrie Works, Airdrie, Lanarkshire.

● Board of Management of the Arthur D. Little Research Institute, Inveresk, Musselburgh, near Edinburgh, will be: LORD BILSLAND (chairman), SIR ROBERT ERSKINE-HILL, DR. D. S. ANDERSON and PROFESSOR SIR IAN HEILBRON for Great Britain, and MR. RAYMOND STEVENS, DR. L. W. BASS and MR. W. A. W. KREBS for the US. The operations of the Institute are being directed by Dr. F. Neville Woodward who has been director of the Institute of Seaweed Research almost since its inception and is now a member of the board of that Institute.

● DR. F. R. SMITH has been appointed to the board of directors of T. and H. Smith Ltd., chemical manufacturers, Edinburgh. He joined the company in 1949, and became research manager in 1951. For several years he was on the staff of the dyestuffs division of Imperial Chemical Industries Ltd., and was chief chemist of Duncan, Flockhart and Co. Ltd., manufacturing chemists, Edinburgh, from 1947 until 1949.

Dr. F. R. Smith who joins the board of T. and H. Smith

● The head of the Mediterranean department of Imperial Chemical Industries, MR. M. N. LUBIN, arrived in Tel Aviv on 27 January. He will study Israel's requirements of ICI products during the coming year.

● MR. ARTHUR CHAMBERLAIN has resigned from the board of Tube Investments and from his appointments with the subsidiary companies of the group.

● MR. E. L. HARRISON, sales director of Quickfit and Quartz Ltd., manufacturers of interchangeable laboratory glassware, Stone, Staffs, will next month be enrolled as a member of the Triplex 21 Club in London. The club is for directors and employees of the Triplex group of companies with 21 years' service.

● MR. S. A. MOUSLEY, general sales manager of Dunlop's general rubber goods division in Manchester, has been appointed general manager of their belting division at Speke.

● MR. G. H. BOLTON, labour officer at ICI Wade works, Northwich, for 17 years, has retired. He entered the service of ICI 29 years ago, in the general chemicals division at Costner-Kellner works (Runcorn) and went to Northwich when the Wade works were built.

● On his appointment as Parliamentary Secretary, Ministry of Health, MR. J. K. VAUGHAN-MORGAN has resigned from the board of the Morgan Crucible Co.

● MR. A. DORMAN and MR. J. B. PEAT have retired from the board of Dorman Long and Co.

● MR. K. W. TREVATT, who has taken up residence at 2 Hightor Road, Woolton, Liverpool, has succeeded MR. W. J. COLE as Liverpool area representative for the Cambridge Instrument Co. Ltd., 13 rosvenor Place, London SW1. Mr. Cole has retired after representing the company in the area for 27 years.

● MR. J. H. BAILEY has joined the board of Negretti and Zambra Ltd.

● The Crookes Laboratories have appointed a new technical representative for Manchester and district. He is MR. ALEC SANDERSON, of Hoyle Street, Facit, Rochdale. Mr. Sanderson, aged 30, studied for the Chemist and Druggist examinations of the Pharmaceutical Society at Salford Royal Technical College and later at Nottingham University, qualifying in 1947.

● MR. OSCAR JOHN DORWIN, a vice-president of the Texas Company since 1951 has been elected a director of the company. He has been the organisation's general counsel since 1944. MR. THEODORE A. MANGELSDORF, who joined the company in 1933 as a chemical engineer, has been elected a vice-president.

● MR. GARTH GLASSON, formerly commercial sales supervisor in the chemical and agricultural division of Pfizer Ltd., Folkstone, has been appointed chemical and agricultural commercial advisor. He will advise Pfizer branches and agents in West Europe and Africa on commercial and marketing methods for the organisation's bulk chemicals and agricultural seed supplements. He retains responsibility for supervising UK chemical sales. MR. JOHN PLATT, former head of the recovery department of the Pfizer fermentation plant at Sandwich has been appointed production controller of the company. He joined Pfizer in August 1954. MR. THOMAS BLACK has been appointed manager of commercial development for the company.

Wills

DR. HERBERT LEVINSTEIN, who died on 3 August last, left £20,959 net. A former managing director of Levinstein Ltd., and technical director of British Dyestuffs Corporation, he was a past-president of the Society of Chemical Industry and of the British Association of Chemists, a director of Lansil Ltd., Lancaster, and Murgatroyds Salt and Chemical Co. Ltd., Sandbach.

MR. GILBERT BOWIE YOUNG, retired chemical manufacturer, 21 Regent Park Square, Strathbungo, Glasgow, who died on 25 August, left £32,244 net.

Obituary

MR. WILLIAM JESSUP WILSON, aged 76, who was vice-chairman of the Crookes Laboratories, Park Royal, London, since November 1932. Mr. Wilson became associated with the Crookes laboratories in 1922 and was vice-chairman to Captain R. C. Kelly, chairman of the Crookes board.

New ICI Office Block in Planning Stage

GENERAL CHEMICALS DIVISION of ICI Ltd. has obtained planning permission in principle for the construction of a large new block of modern office buildings to house the engineering and power departments on the 30-acre site of land recently purchased in upper Runcorn. The area is bounded on one side by Heath Road South and on the other by the golf course.

It is hoped that construction will be started during the spring or early summer. Mr. Frederick Gibberd, architect planner for Harlow New Town and planner of the new terminal buildings at London Airport, has been appointed architect for this scheme.

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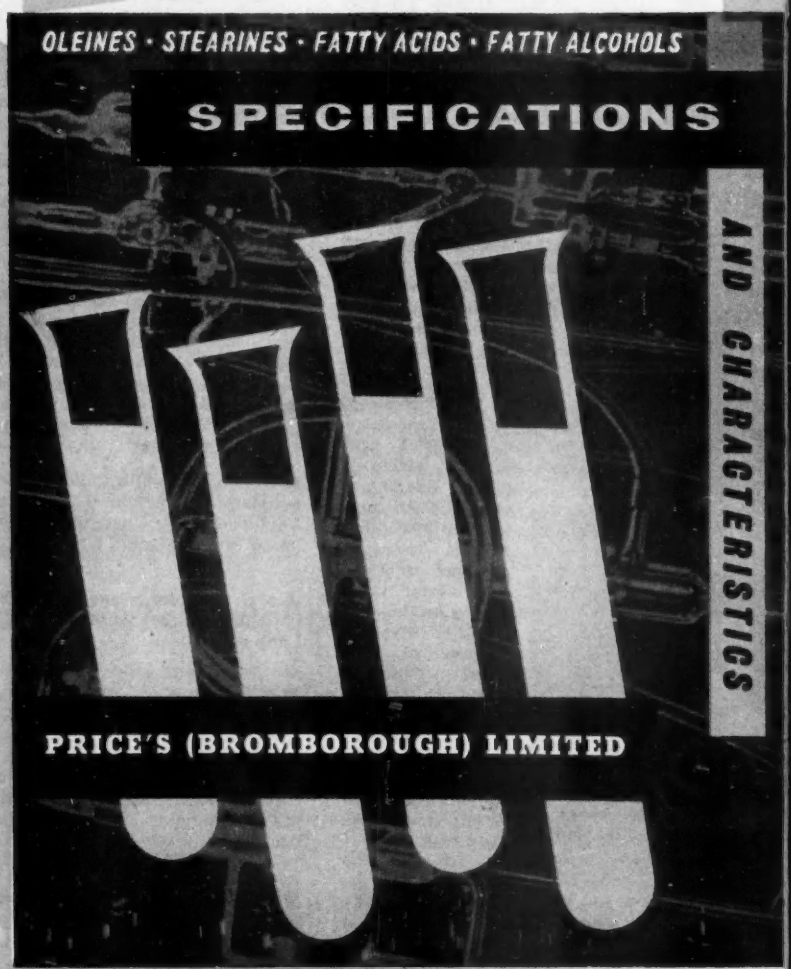

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Commercial News

Shell Transport Arrange for Dealings on New York 'Change

Shell Transport & Trading Co. have arranged for depository receipts to be issued in New York by the Irving Trust Co. against deposits of the company's registered ordinary stock with Lloyd's Bank in London. The company is to apply for the listing of these depository receipts on the New York Stock Exchange.

Head Wrightson

The engineering division of Head Wrightson has become a wholly owned subsidiary of Head Wrightson and Co. Ltd., with the title of Head Wrightson Teesdale Ltd. This took effect on 1 February. The new company will carry on the business of the engineering division with no change of personnel. Correspondence should be addressed to Head Wrightson Teesdale Ltd., Thornaby-on-Tees.

NEW COMPANIES

STAMOGLOU LTD. Capital £5,000. Merchants, importers and exporters of and dealers, agents and brokers in ores and chemicals etc. Director: E. Stamoglou. Registered Office: 73 Basinghall Street, London EC2.

AUTOLAB INSTRUMENTS LTD. Capital £100. Manufacturers of laboratory, and scientific instruments etc. Director: Maurice R. Jackson, 87 Great Portland Street, London W1.

READING PHARMACEUTICALS LTD. Capital £100. Manufacturers of and dealers in chemicals, drugs, gases etc Directors: G. W. Scaddan and D. M. Scaddan. Registered Office: 118 Broad Street, Reading, Berks.

APPLIED ETHICAL RESEARCH LABORATORIES LTD. Limited by guarantee without share capital. The original number of members is 25, each being liable for £1 in the event of winding up. Management is vested in a Council, the first members of which are: Sir Edward C. Dodds, 71 Park Street. London W1; L. M. Froude, 8 West Street, Epsom, Surrey.

INCREASE OF CAPITAL

RONA LABORATORIES LTD., manufacturers of pharmaceutical preparations etc., Stafford House, Norfolk Street, London WC2, increased by £47,000 in £1 ordinary shares beyond the registered capital of £3,000.

LONDON GAZETTE

Liquidator Released

CROSENE MANUFACTURING CO. LTD., registered office, 70 Southampton Way, London SE5, manufacturers and distributors of detergents. Liquidator: D. Morgan, 100 Park Street, London W1, released from 22 October 1956.

Voluntarily Winding Up

[A resolution for the voluntary winding-up of a company does not necessarily imply liabilities. Frequently it is for purposes of internal reconstruction and notice is purely informal.]

BRITISH LUBRICATING OIL AND GREASE RESEARCH ORGANISATION LTD., reg. office: Willow Tree Lane, Yeading, Hayes, Middlesex. By special resolution, 8 January. Mr. F. R. Hopkins, 66 Broad Street, London EC2, appointed liquidator.

Thompson and Capper Extend Speke Plant

FURTHER EXTENSIONS are now being made to the factory of Thompson and Capper Ltd., manufacturing and wholesale chemists, Speke Hall Road, Liverpool, 19. Purpose of the expansion is to give the company more mobility, enabling it to make a wider variety of tablets at any one time.

The new extension will allow the firm to segregate tablets more easily during processing, thus avoiding the dangers of contamination. The new building to be completed shortly, will also greatly increase productive capacity.

Joint British — US Research Institute at Inveresk

UP TO £90,000 a year of US capital will be used to back the Arthur D. Little Research Institute at Inveresk, Musselburgh, near Edinburgh. The organisation is under the joint auspices of the Arthur D. Little Organisation of Cambridge, Mass, USA, and prominent people in Great Britain.

The new organisation has acquired from the Government the laboratories owned by the Institute of Seaweed Research, and in future the latter Institute, in addition to continuing research into seaweed utilisation, will extend the scope of its research work to cover many fields of interest to industry in general.

Two such projects are already in hand, one concerned with a study of the production of flexible plastics from petroleum by-products and the other an investigation into sugar chemistry. Also projected is a research programme on the chemistry of corrosion.

Dr. F. Neville Woodward, who was director of the Seaweed Research Institute, is directing the new Institute. In a statement in Glasgow he said that he hoped within a year to have eight research projects proceeding simultaneously, each financed by a different firm.

Hostel Transferred

His Royal Highness The Duke of Gloucester, on behalf of the King George's Jubilee Trust, visited the King George's House Boys' Hostel, Stockwell Road, London SW9, at 6 p.m. on Wednesday, 23 January, to hand over documents transferring the Hostel from the John Benn Boys' Hostels Association to the National Council of YMCAs.

Market Reports

CHLORATE IN ACTIVE REQUEST

LONDON There has been a continued steady demand for industrial chemicals from home users and for shipment with buying interest spread over most sections of the market. Supplies of most items are adequate and, while keen competition is in evidence, quotations generally remain steady at recent levels. Chlorate and dichromate of soda are in active request and there is a steady outlet for hydrogen peroxide, formaldehyde and copper sulphate with a fair export call for the latter. A good buying interest is reported for the compound and concentrated fertilisers.

Among coal-tar products pitch remains in good demand, while creosote oil and cresylic acid are finding a ready outlet on home and export account.

MANCHESTER A steady movement of chemicals against contracts was reported on the Manchester market during the past week. One or two industrial outlets in the Lancashire area have been affected, directly or indirectly, by the fuel oil shortage and other adverse factors, but most leading consumers are taking good deliveries, while fresh inquiry on both home and export accounts has again been on a fair scale. The price position generally keeps firm. There is an improving seasonal demand for fertilisers, with basic slag and the concentrated fertilisers the most active. Most of the tar products are finding a ready outlet.

GLASGOW A brisk week's trading is the report from the Scottish heavy chemical market, and both for textiles and the heavy industries the demand has been good, covering quite a varied range of chemicals. The export market continues to be active and in regard to fertilisers, a satisfactory volume of forward bookings has been placed. Prices generally have remained unchanged, although some increases have been advised.

NEW PATENTS

By permission of the Controller, HM Stationery Office, the following extracts are reproduced from the 'Official Journal (Patents),' which is available from the Patent Office (Sale Branch), 25 Southampton Buildings, Chancery Lane, London, WC2, price 2s 6d including postage; annual subscription £6 6s.

Specifications filed in connection with the acceptances in the following list will be open to public inspection. Opposition to the grant of a patent on any of the applications listed may be lodged by filing patents form 12 at any time within the prescribed period. Dates on which these applications will be open to inspection are given in 'Official Journal (Patents)'.

ACCEPTANCES

768 636 Separation of mixtures of organic substances by fractional crystallisation. Badische Anilin- & Soda-Fabrik AG.

768 640 Chlorinated isoolefin-polyolefin interpolymers. Goodrich Co., B. F.

768,921 Hydroforming process. Esso Research & Engineering Co.

768 814 Solvent medium for the anthraquinone process for the production of hydrogen peroxide. Allied Chemical & Dye Corp.

768 821 Amino-piperidine-2, 6-dione series. Chemie Grünenthal, Ges.

768 923 Low temperature separation of gas mixtures. Union Carbide & Carbon Corp.

768 925 Glass. Corning Glass Works.

768 667 — 768 668 — 768 669 — 768 670 Polymeric materials. [Divided out of 768 666.] Monsanto Chemicals Ltd.

768 665 Treatment of aqueous liquors. [Divided out of and Addition to 768 662.] Monsanto Chemical Co.

769 192 Hydroxy-phenol-serines. Farbwerke Hoechst AG.

768 941 Separation of phenols from aromatic iso-propyl compounds by distillation. Rütgerswerke AG.

768 995 Liquid vaporisation. Eastman Kodak Co.

769 194 Treatment of glass fibres. Owens-Corning Fibreglass Corp.

769 091 Condensation products, resinous foams and polymeric materials of high molecular weight. Monsanto Chemical Co.

768 999 Diazo-dyestuffs. Ciba Ltd.

769 003 Dibenzothiophene dioxide derivatives. Ciba Ltd.

769 200 Hydroxylation of unsaturated fatty acids and esters thereof. Kessler Chemical Co., Inc.

768 944 Bis-α, α-dimethylbenzyl diether of octa-2:6-diene-1:8-diol. Distillers Co. Ltd.

768 945 Terephthalic acid. Imperial Chemical Industries Ltd.

768 946 Recovery of uranium values. Imperial Chemical Industries Ltd.

769 095 Electrolysis of titanium tetrachloride. Shawinigan Water & Power Co.

768 949 Polyfluorethyl ether condensation products. Consortium für Elektrochemische Industrie Ges.

769 099 Reduction of nickel oxide and the production of nickel carbonyl. Mond Nickel Co. Ltd.

769 010 α-Di-alkoxymethyl - β - alkoxypropionitriles. Shionogi Seiyaku Kabushiki Kaisha.

769 014 Finishing of synthetic fibres. Calico Printers' Association Ltd.

769 018 Non-scorching carbon black product. Cabot Inc., G. L.

769 020 Apparatus for the dressing or concentration of coal ore or other minerals. Westfalia Dinnendahl Gröppel AG.

769 021 Combustible gases from petroleum oil. North Thames Gas Board.

769 102 Perchlorates by electrolysis and electrolyte for use therein. Pennsylvania Salt Manufacturing Co.

769 023 Substituted 1.10-diazo-anthracenes. Ward Blenkinsop & Co. Ltd.

769 026 Alumina and alumina-containing materials. Universal Oil Products Co.

769 027 (Olefinically unsaturated acyloxy) haloalkoxy phosphorus compounds. Union Carbide & Carbon Corp.

769 030 Forming calcium silicate products. Owens-Illinois Glass Co.

768 957 Accelerating cure of inter-polymerisable compositions. Pittsburgh Plate Glass Co.

768 958 Laundry bleaching practice. Olin Mathieson Chemical Corp.

768 961 Thermosetting organopolysiloxane moulding composition. Standard Telephones & Cables Ltd.

769 037 Pigments. Vanderbilt Co. Inc., R. T.

768 964 2-Amino-5-imino-pyrrolenines. Farbenfabriken Bayer AG.

768 965 Cracking heavy hydrocarbon oils. Esso Research & Engineering Co.

769 116 Oxetane polymers. Hercules Powder Co.

768 967 Polyesters. Goodyear Tire & Rubber Co.

769 117 1,4-Aralkyl-piperazines. Morren, H.

769 120 Separation of nickel from cobalt. Soc. Generale Metallurgique de Hoboken.

769 121 Treating radioactive liquids to reduce their radioactivity. Auxiliare des Chemins de fer et de L'Industrie.

769 127 Epoxidation of fatty acids. Food Machinery & Chemical Corp.

769 130 Substituted ureas. Allied Chemical & Dye Corp.

768 971 Antibiotic, D-52 and its salts. Upjohn Co.

769 132 Vinyl chloride polymers for plastisols. United States Rubber Co.

769 137 Lubricating greases. Naamlooze Vennootschap de Bataafsche Petroleum Maatschappij.

769 143 Enamelling of aluminium. Pyrene Co. Ltd.

769 163 Hydrazone dyestuffs. Ciba Ltd.

769 171 Pesticidal and plant growth promoting compositions. Dow Chemical Co.

769 174 Dyeing suede leather. Sandoz Ltd.

769 177 Separating organic compounds from liquid mixtures. Esso Research & Engineering Co.

769 082 Cosmetic paints. Kambersky, H.

769 180 Triorganosilyl amino acids. Midland Silicones Ltd.

769 181 Acylated cyclic hydrazides and fungicidal compositions containing them. Geigy AG., J. R.

769 183 Derivatives of 1.4-diaminoanthraquinone. Badische Anilin & Soda-Fabrik AG.

769 303 Polyacrylonitrile. [Addition to 701 293.] Chemische Werke Hüls AG.

769 293 Hydroaromatic hydrocarbons from coal tar and coal tar fractions. Coal Tar Research Assoc.

769 481 Thiazole carboxylic acid derivatives. Lepetit Soc. Per Azioni.

769 483 Zinc aluminium alloy and process. Neu, W.

769 427 Oleaginous composition. Esso Research & Engineering Co.

769 516 Morphine derivatives. Merck & Co. Inc.

769 440 Phenthiazine derivatives. Soc. Des Usines Chimiques Rhone-Poulenc.

769 403 Contacting liquids with gases. Farbenfabriken Bayer AG.

769 202 Catalytic desulphurisation of petroleum hydrocarbons. British Petroleum Co. Ltd.

769 405 Dye affinity of polyglycol terephthalates. [Addition to 610 140.] Imperial Chemical Industries Ltd.

769 208 Oxidising to disulphides, oil soluble mercaptans or alkali metal mercaptides derived from oil soluble mercaptans. Naamlooze Vennootschap de Bataafsche Petroleum Maatschappij.

769 411 Separation by distillation or sublimation. Naamlooze Vennootschap Philips' Gloeilampenfabrieken.

769 494 Steroid compounds. Merck & Co., Inc.

769 210 Ammonium nitrate blasting explosives. Imperial Chemical Industries Ltd.

769 211 Fractionating starch. [Addition to 722 586.] Cooperatieve Verkooopen Productievereniging Van Aardappelmeel en Derivaten Avebe, G. A.

769 326 Glass fibre reinforced plastics. rods. Pancherz, H. J. J.

769 415 Thermosetting aminoplast compositions. Rütgerswerke AG.

769 217 Alumina and alumina-containing materials. Universal Oil Products Co.

769 450 Mass analysis of ions. Hipple, J. A.

769 454 Fractionation of oils or other soluble mixtures of organic substances by selective extraction. Groll, H. P. A.

769 220 Polyglycol terephthalates. Du Pont de Nemours & Co.

769 222 Esters of dithiocarbamic acids. Monsanto Chemical Co.

769 225 Porous ceramic bodies. Glück, P.

769 458 Metal chlorides, recovery of metals and particularly copper. Ansiau, P.

769 517 Analgesic compositions. Merck & Co., Inc.

769 226 17-Ketosteroids. Upjohn Co.

769 459 Purification of liquids by evaporation. Foster Wheeler Ltd.

769 508 Polymers and heteropolymers of esters of N-carbamylamic acids. United States Rubber Co.

769 344 Pigments comprising sulphonamide-melamine-formaldehyde resins. Switzer Bros., Inc.

769 464 Chromised steels. Deutsche Edelstahlwerke AG.

769 228 Distillation and chemical reaction apparatus. Vunderink, A.

769 229 Stabilisation of hydrazine or aqueous solutions thereof. Olin Mathieson Chemical Corp.

769 346 Hydrogenation of crude hydrocarbon oils. Esso Research & Engineering Co.

769 496 Organosilicon compounds. Midland Silicones Ltd.

769 497 Organosilicon alcohols. Midland Silicones Ltd.

769 498 Organosilicon amines. Midland Silicones Ltd.

769 499 Organosilanes and siloxanes. Midland Silicones Ltd.

(Continued in page 266)

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NEW PATENTS

(*Continued from page 264*)

769 500 Organosilanes. Midland Silicones Ltd.
769 237 Siloxane resin foams. Midland Silicones Ltd.
769 360 Reducing caking of ammonium sulphates or salt mixtures essentially comprising same. Naamlooze Vennootschap Koninklijke Nederlandsche Zoutindustrie.
769 475—769 361 Reducing caking of potassium or ammonium sulphates and mixtures essentially comprising same. Naamlooze Vennootschap Koninklijke Nederlandsche Zoutindustrie.
769 239 Separating tetracycline from chlortetracyline. Pfizer & Co. Inc. C.
769 510 Hydrogenating hydrocarbons. Metallges AG.
769 364 Reaction of benzene and dichlorosilane - trichloro - silane mix. Union Carbide & Carbon Corp.
769 243 Non-dusting and non-caking fertilisers containing potassium salts. Burbach-Kaliwerke AG.
769 248 Imidazolines. Morren, H.
769 252 Textile colouring compositions. Rohm & Haas Co.
769 255—769 271 Aqueous colouring compositions and preparation thereof. Rohm & Haas Co.
769 260 Isomeric racemic dihydrolysergic acids and homologues. Sandoz Ltd.
769 261 Thiamorpholone compounds. Hoffmann-La Roche & Co. AG.
769 267 Fluidised bed roasting of metal sulphide concentrates. Falconbridge Nickel Mines Ltd.
769 269 Dispensing powder into a gaseous stream. Union Carbide & Carbon Corp.
769 270 Butane-1, 2, 4-tricarboxylic acid. Henkel & Cie. Ges.
769 272 Therapeutic compositions. Lepetit Soc. Per Azioni.
769 273 Halogenated carbanilides and compositions containing same. Monsanto Chemical Co.
769 274 Tetracycline antibiotics in oil. Pfizer Corp.
769 275 N-dialkylsulphamyl piperazines and their acid salts. American Cyanamid Co.
769 372 Lubricating oil compositions. Naamlooze Vennootschap de Bataafsche Petroleum Maatschappij.
769 279 Isolation of pyridine carboxylic acids. Lonza Electric & Chemical Works Ltd.
769 375 Leaching and felting glass fibre. Thompson Fiber Glass Co., H. I.
769 281 Hydrogenated liquid polymer oils. Esso Research & Engineering Co.
769 282 Halogen analogues of tropine benzhydryl ether. Fromer, S.
769 283 Purification of water. Ateliers Pingris & Mollet-Fontaine Reunis, and Guinot, H. M.
769 284 Isoindoline derivatives. Hoffmann-La Roche & Co. AG.
769 383 Isopropyl benzene. Universal Oil Products Co.
769 285 4-Substituted 1.2-diphenyl-3.5-dioxo-pyrazolidines. Geigy AG.
769 388 Liquid organosiloxane compositions. Midland Silicones Ltd.
769 287 Partially depolymerised hyaluronic acid and therapeutic composition thereof. American Home Products Corp.
769 288 Incorporation of lignin into synthetic rubber. United States Rubber Co.
769 289 Urine calcium test. Sulkowitch, H.
769 482 Thiazolecarboxylic acid hydrazide. [Divided out of 769 481.] Lepetit Soc. Per Azioni.
769 514—769 515 Hydrogen peroxide. [Divided out of 768 675.] Olin Mathieson Chemical Corp.
769 518—769 519 Normorphine derivatives. [Divided out of 769 516.] Merck & Co., Inc.
769 485 Zinc-aluminium alloys. [Divided out of 769 483.] Neu, W.
769 554 Organic acid addition salts of alkamine esters of unsubstituted aminosalicylic acids and of alkamine esters of aminosalicylic acids substituted at the nitrogen atom and production process. Rheinpreussen AG für Bergbau und Chemie.
769 680 Porour or homogeneous polyurethanes. Farbenfabriken Bayer AG.
769 791 Therapeutic preparation. Koninklijke Industrieele Maatschappij Voorheen Noury & Van der Lande NV.
769 684 Viscometers. National Research Development Corp.
770 046 Fast dyeings and prints on textile materials. Farbwerke Hoechst AG.
769 688 Water-soluble sulphochloracetic acid ester salts of leuco vat dyestuffs. Farbwerke Hoechst AG.
770 021 Feedstuff formulations. Merck & Co., Inc.
769 691 Fluorescent compositions. Switzer Bros., Inc.
769 995 Sulphur recovery from gases containing hydrogen sulphide. Gas Council.
769 998 Steroids. Pfizer & Co., Inc., C.
769 563 Acrylic esters. Rohm & Haas Co.
770 051 Polyisocyanate modified polyesters or polyesteramides. Imperial Chemical Industries Ltd.
769 696 Protector of brassica crops and other plants. Tierney, C.
769 565 Recovering conc. formic acid from its dil. aqueous solutions. Koepp & Co. Chemische Fabrik AG, R.
769 700 Synthetic linear condensation polyesters. Chemstrand Corp.
769 996 Oxidation of hydrogen sulphide to sulphur dioxide. Gas Council.
769 568 Cyclic manufacture of coal water gas. Balfour & Co. Ltd., H., and Lohrisch, F. W.
769 706 Amines and processes for preparation. May & Baker Ltd.
769 997 Analysis of gases containing hydrogen sulphide and sulphur dioxide. Gas Council.
770 038—769 999 Steroid compounds. Pfizer & Co., Inc., C.
770 005 Manufacture of chromane derivatives. Distillers Co. Ltd.
770 057 Phenolaldehyde resins and elastomers for moulding battery cases. Richardson Co.
769 576 Plastic cold deformation of steels. Kabel- und Metallwerke Neumeyer AG.
770 014 Cellulose derivatives and cured products. Naamlooze Vennootschap de Bataafsche Petroleum Maatschappij.
770 058 Acidified malt. Dixon, T. R.
769 681 Cellular foamed plastics. Farbenfabriken Bayer AG.
769 711 Substituted tetrazolines. Herbst, R. M.
769 713 Devices for separating mixtures of liquids. Muller, J.
770 063 Compounds for combating weeds. Uddeholms Aktiebolag.
769 718 Substituted phthalidyl phenols. Goodyear Tire & Rubber Co.
770 065 Tetracycline by fermentation. Bristol Laboratories Ltd.
769 589 Lubricating oil additives. Esso Research & Engineering Co.
769 719 Exothermic mixtures. Lemoine, G. and Loisel, R.
769 924 Screening of filter elements. Muller, J.
770 067 Thermoplastic compositions. Semtex Ltd.
769 595 Vinyl halide polymer compositions and products. Naamlooze Vennootschap de Bataafsche Petroleum Maatschappij.
769 722 2-Diazomethyl-1 : 3 : 5-triazines derivatives. Imperial Chemical Industries Ltd.
769 927 Separator for liquids. Bowser Inc.
769 730 Dressing of leather. Farbenfabriken Bayer AG.
770 112 Hydrometallurgical production of copper. Chemical Construction Corp.
769 733 Compositions containing diarylamines. Goodrich Co., B. F.
770 072 Dough conditioner for bread etc. Ward Baking Co.
770 073 Ethers of alkylphenoxypolyethoxyethanols. Rohm & Haas Co.
770 037 Tensioning filamentary material. [Divided out of 770 036.] Dunlop Rubber Co. Ltd.
770 075 Fibrinogen product, and stable solutions thereof. Cutter Labs.
769 613 N-(carbamyl) amides and compositions containing same. Du Pont de Nemours & Co., E. I.
769 736 Emulsifier mixtures. General Aniline & Film Corp.
769 618 Diazo dyestuffs derived from diphenyl sulphide. Farbenfabriken Bayer AG.
769 622 Substituted amides. Rohm & Haas Co.
769 623 Substituted nitriles and use as plasticisers. Rohn & Haas Co.
769 627 Granulating urea - formalde - hyde fertiliser compositions. Du Pont de Nemours & Co., E. I.
770 080 Alkenylaryl glycidyl ethers and polymers thereof. Naamlooze Vennootschap de Bataafsche Petroleum Maatschappij.
769 946 Polyester resins. Rohm & Haas Ges.
769 628 Cation-exchangers. Farbenfabriken Bayer AG.
769 742 Therapeutic compositions of 1-nicotinyl - 2 - cyclohexylidenehydrazine. Lepetit Soc. Per Azioni.
770 020 Separating mixtures of solid substances into fractions according to specific gravity. Stamicarbon N.V.
769 952 Disinfectants. Chemische Werke Hüls AG.
769 632—769 953 Siloxanes. Midland Silicones Ltd.
769 954 Vitamin B_{12} antagonist factor. Armour & Co.
769 958 Synthetic resin coating compositions. Rohm & Haas Co.
769 749 Manufacture of coloured photographic layers. Gevaert Photo-Producten N.V.
769 750 Apparatus for burning and heating finely-divided carbon-containing particles. Esso Research & Engineering Co.
769 751 Determining evaporation characteristics of a hydrocarbon oil, and a controlling quality of same. Shell Research Ltd.
770 007—770 008 Antiperspirant compositions. Hedley & Co. Ltd., T.
769 963 Phenol derivative and salts thereof. [Addition to 749 100.] Hoffmann-La Roche & Co. AG.
769 640 Glycinamide derivatives. American Home Products Corp.
769 641 Process and apparatus for extracting liquids. Farbenfabriken Bayer AG.

(*Continued in page 268*)

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Societe Co-operative des Produits Agricoles, GOMA, Belgian Congo.

NEW PATENTS

(Continued from page 266)

769 756 Composition for making odourless, non-exuding vinylidene chloride copolymer film. Dow Chemical Co.

769 973 Sulphuric acid ester salts of leuco vat dyestuffs of the anthraquinone series. [Addition to 719 621.] Durand & Huguenin AG.

769 974 Water-in-oil emulsions containing latex. Interchemical Corporation.

770 121 Therapeutic compositions. Danske Medicinal- & Kemikalie-Kompagni Aktieselskab.

769 813 Cyclopentadiene by depolymerisation of dicyclopentadiene. Chemische Werke Hüls AG.

769 976 Poly [3-(lower-alkylcyclohexyl) propyl] amines. Sterling Drug, Inc.

769 757 Sulphonamides. American Cyanamid Co.

769 980 Hydantoin derivatives. Cutter Labs. Inc.

769 818 Catalytic cracking of hydrocarbon oils. Naamlooze Vennootschap de Bataafsche Petroleum Maatschappij.

770 006 Production of a hydroperoxide. [Divided out of 770 005.] Distillers Co. Ltd.

769 652 β-Aminovinyl carbonyl compounds. Badische Anilin- & Soda-Fabrik AG.

769 766—769 767 Steroid compounds. Pfizer & Co., Inc., C.

769 653 Nicotinic acid amide. Lustig, O.

769 820 Thermoplastic resinous compositions. Goodrich Co., B. F.

769 771 Hydrazones. Geigy AG., J. R.

769 773 Vinyl chloride from acetylene and hydrogen chloride. Badische Anilin- & Soda-Fabrik AG.

769 664 Conversion of organic sulphur comps. industrial gases into hydrogen sulphide. Ruhrchemie AG and Bischoff Ges., G.

769 666 Foamosols and expanded plastics therefrom. Rohm & Haas Co.

770 129 N-alkyl piperidine monocarboxylic acid amides and N-alkyl pyrrolidine α-monocarboxylic acid amides. Aktiebolaget Bofors.

769 823 Rubber treatment. United States Rubber Co.

770 132 Storage containers for liquefied gases. Union Carbide & Carbon Corp.

769 779 Oxalate coatings on metal surfaces. Pyrene Co. Ltd.

769 669 Organopolysiloxane compositions. Midland Silicones Ltd.

769 827 Hydrochlorides of 2-aminothiazoles. Olin Mathieson Chemical Corp.

769 829 Synthesis gas production. Foster Wheeler Ltd.

769 854 Desulphuration of gases. Ateliers Pingris & Mollet-Fontaine Reunis, and Guinot, H. M.

769 855 Device separating dust or liquid particles from gaseous medium. Aktiebolaget Svenska Flaktfabriken.

770 138 Scandium extraction from its ores. Pechiney Compagnie de Produits Chemiques et Electrometallurgiques.

769 866 Benzene hexachloride. Columbia-Southern Chemical Corp.

769 871 Low alloy steel for sub-zero temperature application. Union Carbide Ltd.

769 897 Separating mixtures of solid particles of different porosities. Naamlooze Vennootschap de Bataafsche Petroleum Maatschappij.

769 898 Separation of a mixture of phases. Naamlooze Vennootschap de Bataafsche Petroleum Maatschappij.

769 682 Apparatus for production of porous or homogeneous plastics. Farbenfabriken Bayer AG.

770 022 Animal feed supplements containing penicillin. [Divided out of 770 021.] [Addition to 730 249.] Merck & Co. Inc.

770 000 Steroids. [Divided out of 769 998.] Pfizer & Co., Inc., C.

770 039 Steroid compounds. [Divided out of 770 038.] Pfizer & Co., Inc., C.

770 156 Organo-silicon compounds. Wacker Ges. für Elektrochemische Industrie Ges., Dr., A.

770 391 Treating liquid hydrocarbons with moving adsorbents. Socony Mobil Oil Co. Inc.

770 392—770 393 Continuous percolation of liquid hydrocarbons. Socony Mobil Oil Co. Inc.

770 511 Therapeutic agents. Rheinpreussen AG Fuer Bergbau und Chemie.

770 396 Fluid filter elements. Vokes, Ltd.

770 631 Foams of very low specific gravity from polyesters, polyisocyanates and water. Farbenfabriken Bayer AG.

770 640 Aliphatic fluorine compounds. Farbwerke Hoechst AG.

770 513 Descaling ferrous metal strips. Thomas, E.

770 273 Polymeric products from vinyl aromatic hydrocarbons. Styrene Products, Ltd.

770 618—770 619 Nitrogen - containing organic compounds. Haseldine, R. N.

770 516 Roasting of comminuted, roastable, sulphur-containing materials. Badische Anilin- & Soda-Fabrik AG.

770 277 Amino-propanediols and derivatives. Parke, Davis & Co.

770 278 Fuel composition. Esso Research & Engineering Co.

770 163 Heat-exchange apparatus. APV Co. Ltd.

770 646 Plastic strips. Svenska Aktiebolaget Polva.

770 401 Heat-treating metals in non-oxidising protective gas atmosphere. Siemens & Halske Ges.

770 410 Bis (p-aminophenoxy) derivatives of aliphatic hydrocarbons. Wellcome Foundation Ltd.

770 281 Combustible mixtures for internal-combustion engines. Daimler-Benz AG.

770 521 Benzene carboxylic acids. Newby, H. (Chemische Werke Huls Ges.).

770 650 Separation of aromatic isopropyl compounds from phenols. [Addition to 768 941] Rütgerswerke AG.

770 172 Preparation of ammonium sulphate. Stamicarbon NV.

770 289 Polyisocyanate modified polyesters and polyesteramides. Imperial Chemical Industries Ltd.

770 525 Steroid substances. GNRD Patent Holdings Ltd.

770 526 Foamed-crosslinked polyurethanes. National Research Development Corp.

770 439 Filters for fluids. General Motors Ltd.

770 293 Recovery of wax from mixtures of wax and feathers. Morgan, C. G.

770 294 Organic mercury compounds. [Addition to 695 704.] Cassella Farbwerke Mainkur AG.

770 411 Aminophenoxyalkane derivatives. Wellcome Foundation Ltd.

770 531 Highly polymeric polymethylene terephthalates. Imperial Chemical Industries Ltd.

770 415 Processing of fibres. Imperial Chemical Industries Ltd.

770 416 Processing of polyester fibres. Imperial Chemical Industries Ltd.

770 299 Production of amines. Imperial Chemical Industries Ltd.

770 622 Aromatic ketone hydroperoxides. Distillers Co. Ltd.

770 623 Keto-phenols. Distillers Co. Ltd.

770 412 Aminophenoxyalkanes. Wellcome Foundation Ltd.

770 662 Insolubilising artificial filaments, threads, fibres, etc., obtained by the spinning of solutions of proteins. Imperial Chemical Industries Ltd.

770 306 Therapeutic derivs. of *p*-aminosalicylic acid. Cassella Farbwerke Mainkur AG.

770 539 Bonding synthetic resins to solid materials. Farbenfabriken Bayer AG.

770 309 Compositions for diabetes mellitus. Shionogi Seiyaku Kabushiki Kaisha.

770 310 Compositions of surface-active components. Naamlooze Vennootschap de Bataafsche Petroleum Maatschappij.

770 454 Thermoplastic adhesives. Brown-Bridge Mills Co.

770 541 Catalytic conversion of heavy hydrocarbon oils. Gulf Research & Development Co.

770 542 Preparation of hecogenin. National Research Development Corp.

770 460 Textile and dyeing assistants. [Addition to 668 961.] Badische Anilin- & Soda-Fabrik AG.

770 417 Stable aqueous penicillin preparation. Smith Kline & French International Co.

770 624 Substituted endoxyperhydroisoindolines. Geschickter Fund for Medical Research Inc.

770 201 Heat exchangers. Munters, C. G.

770 546 Resinous compositions. Dunlop Rubber Co. Ltd.

770 202 Filters. Begg, Cousland & Co. Ltd., and Begg, R. W.

770 632 Elastic, semi-rigid and rigid foams from polyisocyanate-modified polyesters. Farbenfabriken Bayer AG.

770 322 Cation exchange resins. Permutit Co. Ltd.

770 551 Continuous esterification process. Celanese Corp. of America.

770 426 Non-toxic fat emulsions for intravenous administration. Armour & Co.

770 427 Non-toxic soya bean phosphatide fat emulsifiers. Armour & Co.

770 556 Fluid filters. Bendix Aviation Corp.

770 687 Producing cellulose. Aschaffenburger Zellstaffwerke AG.

770 688 Blending plastics and fluids. Welding Engineers Inc.

770 394 Apparatus for treating liquids with moving adsorbents. [Divided out of 770 391.] Socony Mobil Oil Co. Inc.

770 558 Copal for technical purposes. Vuagnat, G.

770 559 Filters. Walter, F.

770 338 Meta-aminostyrene. Union Carbide & Carbon Corp.

770 419 Heterocyclic pyrophosphate esters. Union Carbide & Carbon Corp.

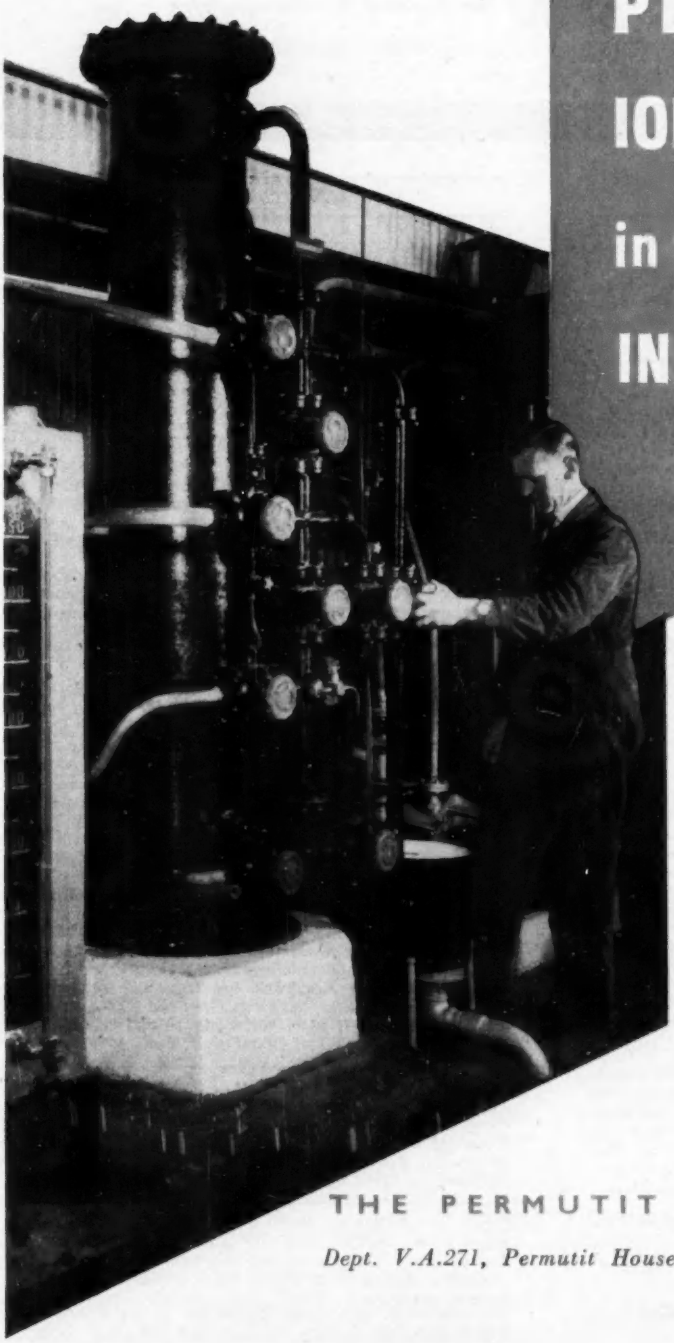
770 220 Apparatus for mixing liquid or plastic materials. Dunlop Rubber Co. Ltd.

770 221 Isomerisation process. Standard Oil Co.

770 693 Composition for diseases associated with plasmin activation and other pathological proteolytic action. Mitsubishi Kasei Kogyo Kabushiki Kaisha.

770 222 Polybasic aromatic acids and esters. Esso Research & Engineering Co.

770 224 Terephthalic acid. Naamlooze Vennootschap de Bataafsche Petroleum Maatschappij.



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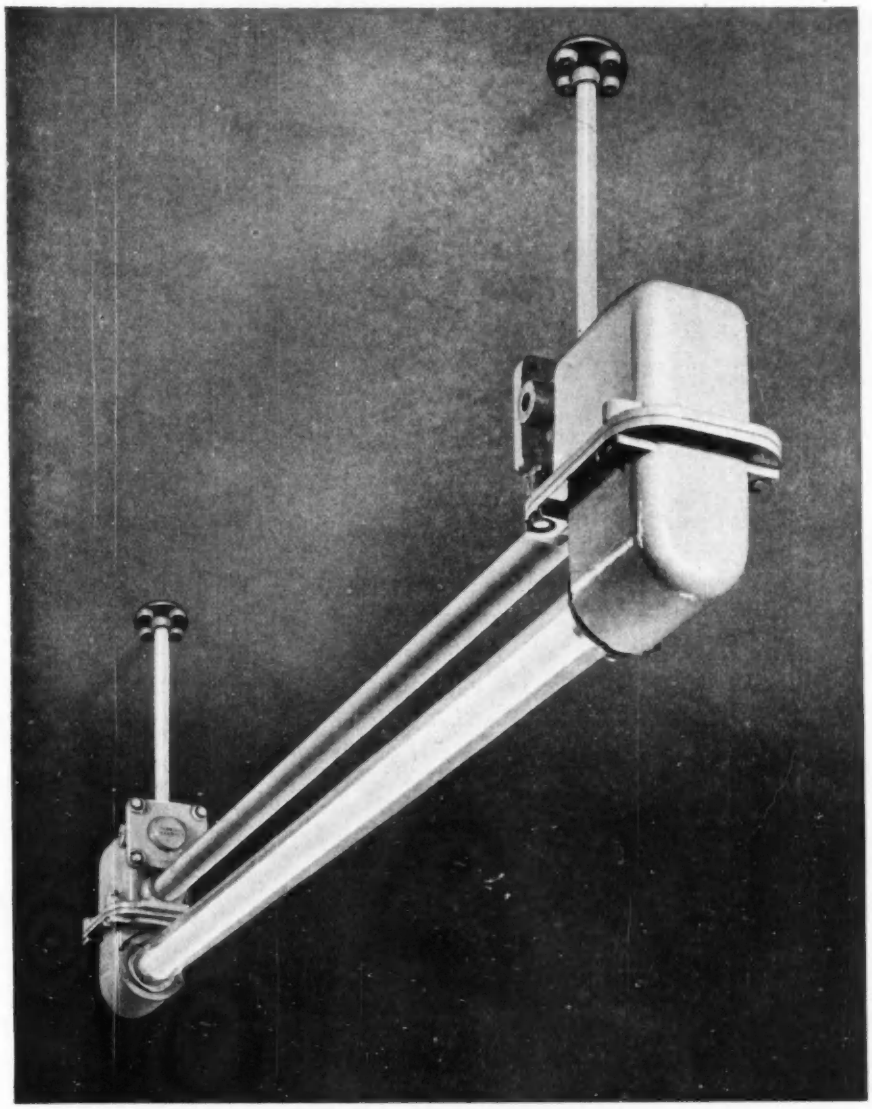

Fitting illustrated F65801/2

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- *Each fitting is the result of the closest collaboration between expert designers and lighting engineers.*
- *Each fitting is made to rigid factory standards for long arduous service.*
- *Operating efficiency is guaranteed because the control gear and tubes are made within the G.E.C. organisation.*
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BORON TRIFLUORIDE-ACETIC ACID COMPLEX

Used as a catalyst in polymerisation, alkylation, condensation and other organic reactions.

PHYSICAL PROPERTIES

Specific gravity 1·4

The commercial product containing 40 per cent. boron trifluoride is a pale yellow or brown, rather viscous liquid. It fumes slightly in moist air and is decomposed by water.

On heating, boron trifluoride is evolved until the strength is reduced to 36 per cent. BF_3 corresponding to the compound $BF_3 \cdot 2CH_3COOH$. This then distils unchanged at 140°C.

On cooling, the 40 per cent. BF_3 complex becomes very viscous below 0°C., but does not freeze even on prolonged standing at −10°C.

BORON TRIFLUORIDE GAS

Used as a catalyst in polymerisation, alkylation, condensation, and other organic reactions.

As a gaseous flux in metal brazing.

CHEMICAL PROPERTIES

The dry gas does not react with metals at room temperatures.

It forms a hydrate $BF_3 \cdot 2H_20$ with water, and readily forms complexes with oxygen-containing organic compounds, e.g. ethers, phenols, alcohols, acids and aldehydes.

PHYSICAL PROPERTIES

The following published data refer to the pure product:

Boiling point	−101°C.
Freezing point	−128°C.
Critical temperature	−12·25°C.
Critical pressure	49·2 atmos.
Density of gas	3·06 gms./litre at S.T.P.

Commercial gas contains not less than 98·5% BF_3

High Purity gas contains not less than 99·8% BF_3

CONTAINERS

Steel cylinders 5-6 lbs. or 40-45 lbs. net capacity at 1,800 lb./sq. in. pressure.

Advice on materials of construction and on handling may be obtained from

IMPERIAL SMELTING

U.K. MEMBER OF THE CONSOLIDATED ZINC CORPORATION LIMITED

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